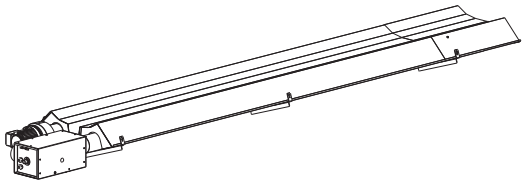
INSTALLATION AND OPERATION INSTRUCTIONS
INFRARED RADIANT IP55 POULTRY TUBE HEATER

Single Stage Pull Through System (Negative Pressure)

Models: SBF 25 - IP55

0086



OWNER / INSTALLER: For your safety this manual must be carefully and thoroughly read and understood before installing, operating or servicing this heater. This heater is intended for use with either Natural Gas or Propane Gas. It must be installed by a qualified service person or a licensed contractor in accordance with state and local codes.

▲WARNING: Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury or death. Read the installation, operation and maintenance instructions thoroughly before installing or servicing this equipment. For assistance or additional information, consult a qualified installer, service agency or the gas supplier.

INSPECT all combustion air openings into the building and, if necessary, clear as they become blocked by litter, dust, feathers or other matter.

FOR YOUR SAFETY: Exhaust fans **MUST** be operating on an appropriate cycle when heaters are operating to avoid a high concentration of carbon monoxide. When used without fresh air, this heater may give off carbon monoxide, an odorless and poisonous gas. **CARBON MONOXIDE POISONING MAY LEAD TO DEATH**. Early signs of carbon monoxide poisoning resemble the flue with headaches, dizziness and nausea. If you experience these signs, **GET FRESH AIR IMMEDIATELY!** Have the heaters serviced as soon as possible and check the ventilation in the house.

These heaters are designed for agricultural applications and may operate with the use of either Natural Gas or Liquid Propane (LP) Gas. Check the heater's nameplate to determine the correct gas type before proceeding with installation.

!INSTALLER: This manual is the property of the owner. Please present this manual to the owner when you leave the job site.

IF YOU SMELL GAS:

FOR YOUR SAFETY

- **DO NOT** try to light any appliance.
- **DO NOT** touch any electrical switch; **DO NOT** use any telephone in your building.
- **IMMEDIATELY** call your gas supplier from a neighbor's telephone. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.

DO NOT store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

!IMPORTANT: SAVE THIS MANUAL FOR FUTURE REFERENCE.

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1.0) SAFETY

This heater is a self-contained infrared radiant tube heater designed for use in poultry applications. Safety information required during installation and operation of this heater is provided in this manual and the labels on the product. The installation, service and maintenance of this heater must be performed by a contractor qualified in the installation and service of gas fired heating equipment.

All personnel in contact with the heater must read and understand all safety information, instructions and labels before operation. The following symbols will be used in this manual to indicate important safety information.

⚠ WARNING **Warning** instructions must be followed to prevent or avoid hazards which may cause serious injury, property damage or death.

⚠ CAUTION **Caution** instructions must be followed to prevent incorrect operation or installation of the heater which may cause minor injury or property damage.

2.0) INSTALLER RESPONSIBILITY

The installer is responsible for the following:

- The heater and venting, as well as electrical and gas supplies must be installed in accordance with these installation instructions and any applicable codes and regulations.
- Every heater shall be located with respect to building construction and other equipment so as to permit access to the heater.
- Each installer must follow the clearances to combustible materials for the heaters.
- Install the heater so that the supports and hangers are correctly spaced in accordance with these instructions. The heater must be supported by materials having a working load limit of at least 52kg.
- Supply the owner with a copy of these Installation and Operation Instructions.
- Never use the heater as a support for a ladder or other access equipment. Do not hang anything from the heater.
- Supply all installation materials necessary that are not included with the heater.
- Check the nameplate to make sure that the burner is correct for the gas type in the building and the installation altitude.
- Apply silicone sealant to the joint of the fresh air intake to prevent the introduction of moisture into the system.

3.0) GENERAL INFORMATION

This heater is a self-contained infrared radiant tube heater designed for use in poultry houses where flammable gases or vapors are not generally present. This heater has been approved for enclosure rating of IP55. This means it is electrically safe after wash down with a maximum of 12.5l/min at 80kPa.

Installation of this heater must be in accordance with all applicable codes shown in the instructions and/or the local codes and authorities having jurisdiction. Clearances to combustibles as outlined in the manual should always be observed. In areas used for storage of combustible materials where they may be stacked below the heater, the installer must post signs that will "specify the maximum permissible stacking height to maintain the required clearances from the heater to combustibles."

Inspect all openings regularly and clean as necessary. This is necessary because litter, dust feathers and other matter can become airborne and clog openings and adversely affect heater operation and performance.

Every heater shall be located with respect to building construction and other equipment so as to permit access to the control housing. Each installer shall use skillful and reliable installation practices when locating the heaters and must give consideration to service accessibility.

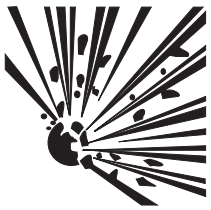
This heater is for **INDOOR INSTALLATION ONLY** and is used in **VENTED or UNVENTED** mode. The term *Unvented* actually means *Indirect Vented*. While the products of combustion are expelled into the building, national codes require ventilation in the building to dilute these products of combustion. This ventilation must be provided by gravity or mechanical means. Ventilation requirements are addressed further in these instructions.

Although these heaters may be used in many applications other than space heating (e.g., process heating), Space-Ray will not recognize the warranty for any use other than space heating.

This heater is not an explosion proof heater. Where the possibility of exposure to volatile and low flash point materials exists, it could result in property damage or death. This heater must not be installed in a spray booth where the heater can operate during the spraying process. Consult your local fire marshal or insurance company.

4.0) MINIMUM CLEARANCES TO COMBUSTIBLES

⚠ WARNING

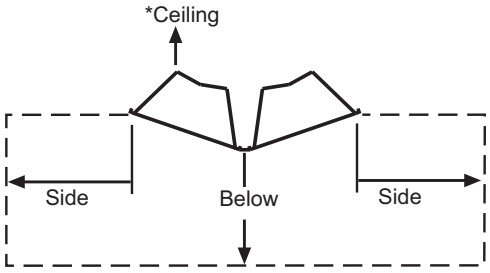


FIRE AND EXPLOSION HAZARD

Combustible material must be located outside the clearance dimensions listed.

Failure to do so may result in death, serious injury or property damage.

Minimum clearances to combustibles shall be measured from the outer surfaces as shown in the following diagram:



Horizontal

MINIMUM CLEARANCES TO COMBUSTIBLES				
	Mounted Horizontally			
Model No.	Sides	Ceiling	Below	Ends
SBF 25	36" (91cm)	12" (30cm)	69" (175cm)	32" (81cm)

Fig. 1

▲WARNING: Certain materials or objects, when stored under the heater, will be subjected to radiant heat and could be seriously damaged. Observe the Minimum Clearances to Combustibles listed in the manual and on the heater at all times.

NOTE:

1. The clearances specified above must be maintained to combustibles and other materials that may be damaged by temperatures 32º C (90º F) above ambient temperature. Clearances to combustibles are posted on the control box. In areas used for storage of combustible materials where they may be stacked below the heater, The installer should post signs that will "specify the maximum permissible stacking height to maintain the required clearances from the heater to combustibles." Space-Ray recommends posting these signs adjacent to the heater thermostat or other suitable location that will provide enhanced visibility.

2. The stated clearance to combustibles represents a surface temperature of 32º C (90º F) above room temperature. Building materials with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation.

5.0) SPECIFICATIONS

Model No.	SBF 25-N IP55	SBF 25-L IP55
Heat Input, kW Hs	23.45	23.45
Heat Input, kW Hi	21.86	21.86
Appliance Type	A2, B22, C52	A2, B22, C52
Appliance Category	II_{2H3P}	II_{2H3P}
Gas	2H G20	3P G31
Supply Pressure, mbar	20	37
Setting Pressure, mbar	12.5	25
Injector	3.8mm	2.6mm
Burner Baffle Plate	12 x 12mm holes	12 x 12mm holes
Exhauster Baffle Plate	Ø47.6mm ID	
Electrical Supply	230V – 50Hz	
Power Consumption	125W	
Fuse Externally Rating	3A	
Protection Rating	IP55	
Min. Length	4M	
Max. Length	4M	
Width	65cm	
Gas Connection	R -1/2	
Flue Size	Ø100mm	
Minimum Recommended Mounting Height	4.0m	

6.0) PACKING LIST – SBF 25 – IP55

A. SBF 25 - IP55 Main Body Components

The appliances are supplied as follows (see Fig. 2):

			System Lengths
Ref. No.	Part No.	Part Description	6M
			QTY
1	See list.	Control Box Package (includes fan)	1
2	43509378	Fan – **McMillan** (w/47.6mm ID plate)	1
3	43318050	Hanger Brackets – 19 Deg	3
4	30462980	Torctite Coupling	1
4a	44015251	Tube Flange Assembly (included with fan)	1
5	See B.	Fastenings Pack	1
6	41932100	Radiant Tube (Ø101.6mm x 3m)	2
7	42913000	U-Bend	1
8	43319100	Reflector – Main Panel (3035 long)	2
9	43341000	Reflector Kit - End Panel (includes clips)	1
10	43490010	Reflector – Overlap (U-Bend)	1
11	43490020	Reflector – Foot End	1
12	44152240	Turbulator	2
13	44129520	Flexible Hose Kit (w/2 clamps)	1

B. SBF 25-IP55 Body Fastener Kit (included in body package)

Body Fastener Kit		42907370
02125130	Screw, #10-24 x ½" Round Head Machine	6
02189020	Screw, #10-16 x ½" Self-Drill (TEKS)	12
02266010	Speed Clip (foot end reflector)	7
02127110	Hex Nut, 5/16-18	12
42873000	U-Bolt	6
42769010	Clamp, Sliding (reflector)	6
30545040	Turnbuckle (control suspension)	1
30303010	S Hooks (suspension)	6

CONTROL BOX PACKAGE NUMBERS

Gas Type 2H G20		Gas Type 3P G31	
MODEL NO.	**PART NO.**	**MODEL NO.**	**PART NO.**
SBF 25-N - IP55	#44473000	SBF 25-L - IP55	#44473500

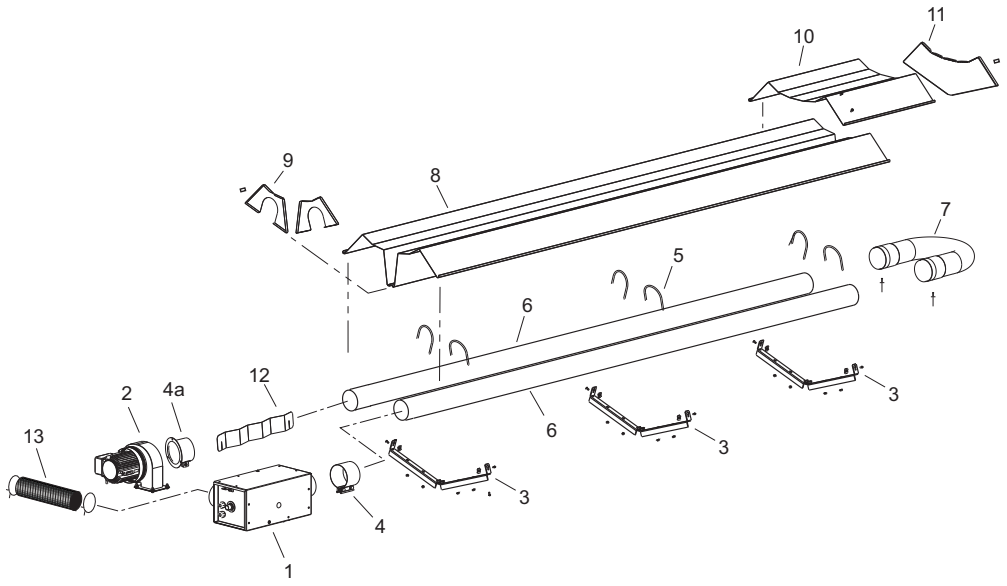


Fig. 2

COMPLETE MODEL SYSTEM

- Includes Control Box and Body Package -

MODEL		GAS TYPE	SYSTEM LENGTH	TUBE MATERIAL
SBF Series	SBF 25-N-IP55-6	2H G20	6M	Aluminized Steel
	SBF 25-L-IP55-6	3P G31	6M	Aluminized Steel

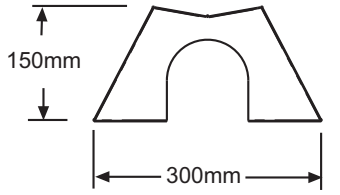
STANDARD/OPTIONAL ACCESSORIES

Part #	Description
44129500	Kit, Fresh Air Intake – Ceiling
44129510	Kit, Fresh Air Intake – Sidewall (includes 100mm vent cap)
43341000	Kit, Reflector End Panels (packaged with control box)
2160	Manual Cut Off Valve
4262504	Gas connector
4262900	Hanging Chain, 10m

6.1) ACCESSORY PACKAGES

A. <u>End Reflector Accessory Package, Part #43341000</u>
(1 pkg. per Straight Configuration Series)

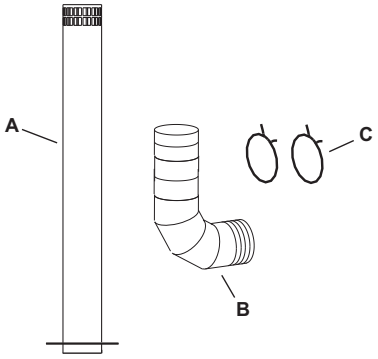
Contains:
End Reflector, #43320000.....QTY–2
Speed Clips, #02266010.....QTY–8



END REFLECTOR

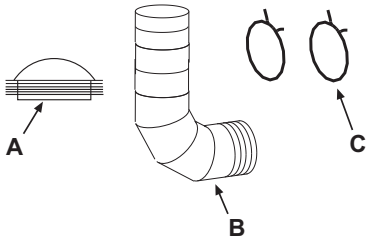
B. <u>Fresh Air Inlet (Through Ceiling) Package, Part #44129500</u>

Contains:
a) 101.6mm Air Intake Assembly, #44129000.....QTY–1
b) 101.6mm x 610mm Flexible Hose, #30675020 QTY-1
c) 101.6mm Spring Tension Clamp, #30676040 QTY-2
d) #12 x ¾" Sheet Metal Screws, #02240010.....QTY–4



C. <u>Fresh Air Inlet (Through Sidewall) Package, Part #44129510</u>

Contains:
a) 101.6mm Vent Cap, #41000020.....QTY–1
b) 101.6mm x 610mm Flexible Hose, #30675020 QTY-1
c) 101.6mm Spring Tension Clamp, #30676040 QTY-2

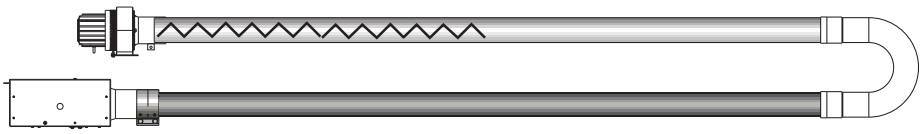


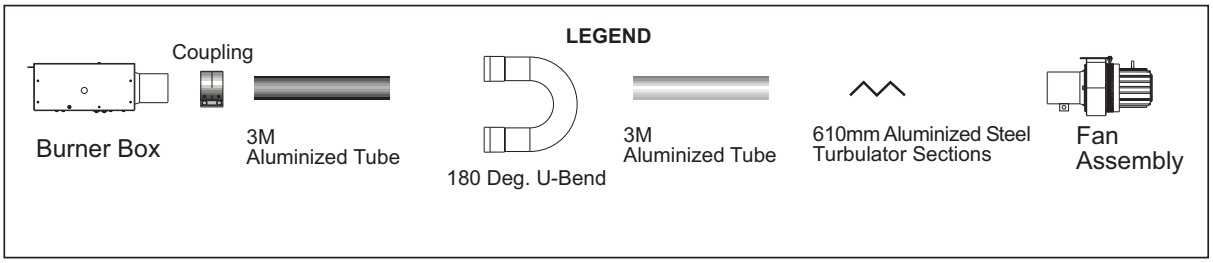
7.0) TYPICAL ASSEMBLY LAYOUTS

MODEL	EMITTER TUBE LENGTH	SYSTEM LENGTH*	610mm Turbulator Sections
SBF 25-6	3m (2 each)	6m	2

*Plus U-Bend

6M SYSTEM





NOTES:
1. A U-Bend is used as shown above to create a "U" configuration.

Fig. 3

8.0) DIMENSIONS – MODELS SBF 25-6M

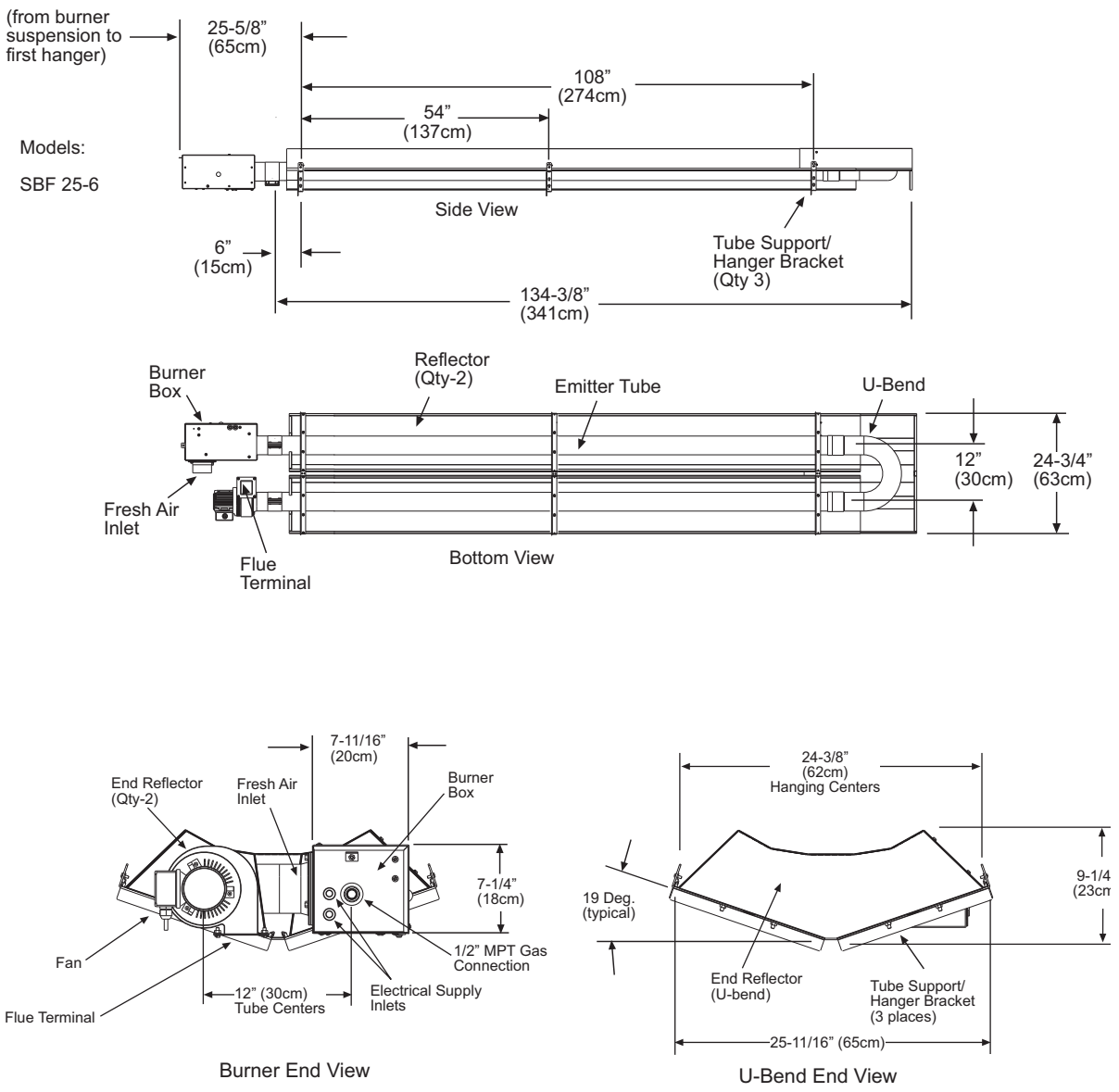


Fig. 4

8.1) HEATER ASSEMBLY – TYPICAL OVERVIEW (6M SYSTEM SHOWN)

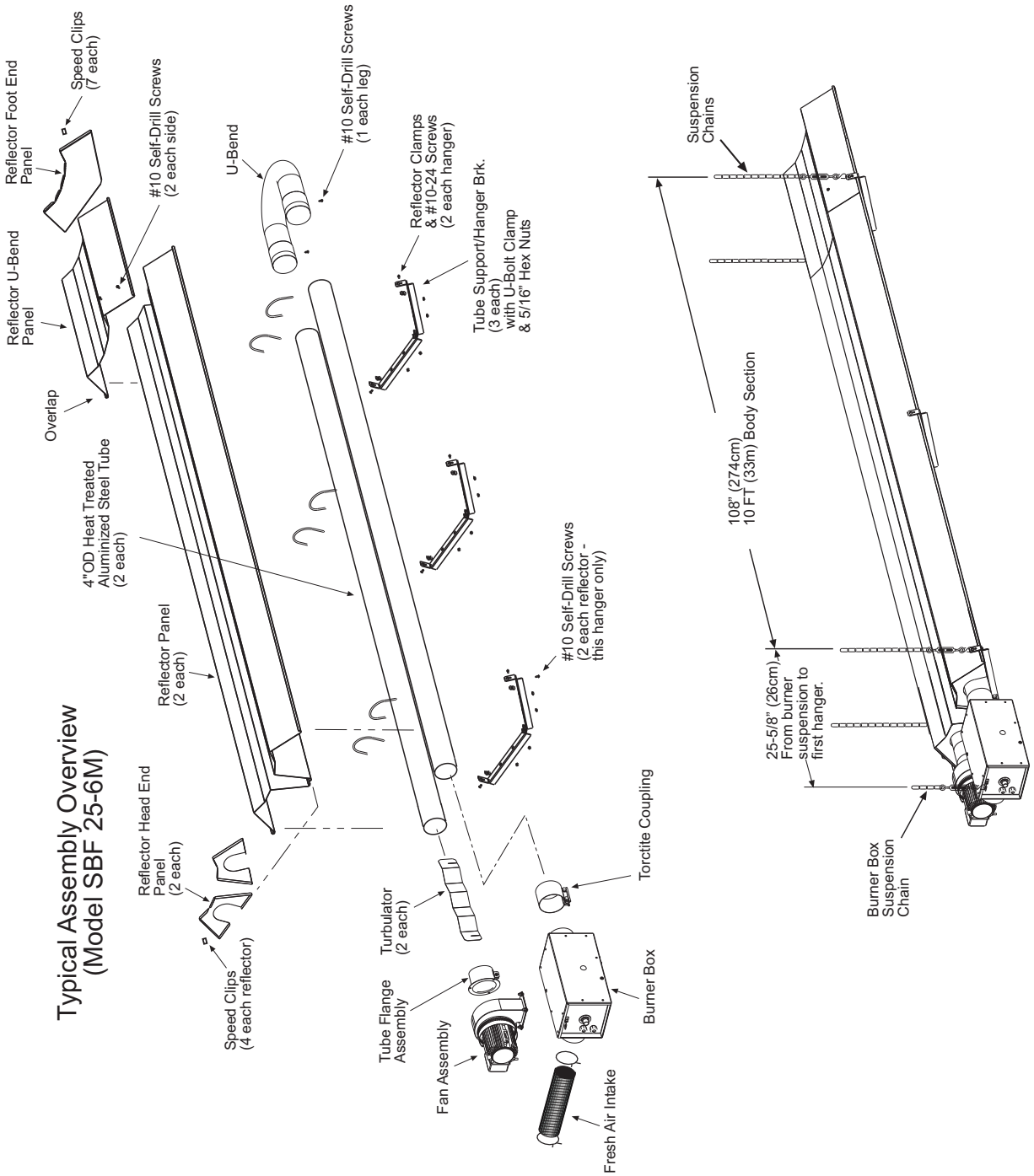

Typical Assembly Overview
(Model SBF 25-6M)
Reflector Foot End Panel
Speed Clips (7 each)
#10 Self-Drill Screws (2 each side)
Reflector U-Bend Panel
Overlap
4"OD Heat Treated Aluminized Steel Tube (2 each)
Reflector Panel (2 each)
Reflector Head End Panel (2 each)
Speed Clips (4 each reflector)
U-Bend
#10 Self-Drill Screws (1 each leg)
Reflector Clamps & #10-24 Screws (2 each hanger)
Tube Support/Hanger Brk. (3 each) with U-Bolt Clamp & 5/16" Hex Nuts
#10 Self-Drill Screws (2 each reflector - this hanger only)
Turbulator (2 each)
Tube Flange Assembly
Fan Assembly
Fresh Air Intake
Torctite Coupling
Burner Box
Suspension Chains
108" (274cm) 10 FT (33m) Body Section
25-5/8" (26cm) From burner suspension to first hanger.
Burner Box Suspension Chain

Fig. 5

9.0) TYPICAL SUSPENSION METHODS

Not with standing their limited scope, the appliance should be installed in accordance with the relevant provisions of any National Gas Safety (Installation and Use) Regulations. Due account should also be taken of any obligations arising from any National Health and Safety at Work Regulations, National and Local Building Regulations and National Electrical Wiring Regulations. The appliance must be installed, and where necessary, converted for use on other gases, by a qualified installer.

⚠ WARNING

SUSPENSION HAZARD

Burner must be secured to the mounting flange with nuts.

All materials used to suspend the heater must have a minimum working load of 52kg.
All "S" Hooks must be crimped closed.

Never use the heater to support a ladder or other access equipment.

Failure to do so may result in death, serious injury or property damage.

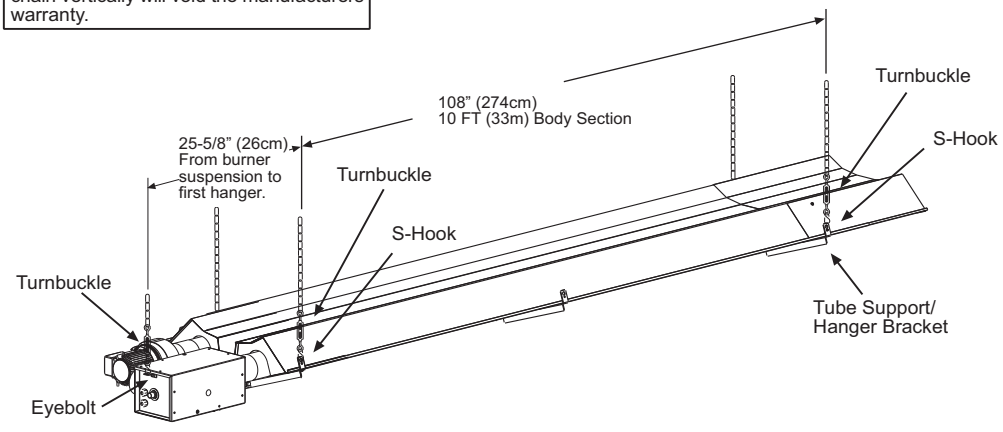
Various means of suspending the heater can be used. See the following drawings for typical examples.

1. Use only noncombustible materials for suspending hangers and brackets.
2. Turnbuckles can be used with chains to allow leveling of the heater. All "S" hooks and eye bolts must be manually crimped closed by the installer.
3. For suspending the appliance it is recommended that suitable protected welded chain (Ø 3mm x 65 links per m) or Ø 8mm min mild steel drop rods and suitable brackets are used. Attach the chains or drop rods to the hanger brackets where shown providing at least Ø 5mm closed link hooks are used chains may be attached directly to the hanger brackets.
4. Heaters subject to vibration must be provided with vibration isolating hangers.
5. Heaters must not be supported by gas or electric supply lines and must be suspended from a permanent structure with adequate load capacity.

Space-Ray recommends that the body sections be suspended using chains with turnbuckles. This will allow slight adjustments after assembly and heater expansion/ contraction during operation.

⚠ CAUTION

Failure to install the burner box suspension chain vertically will void the manufacturers warranty.



Burner Box Suspension

Fig. 6

10.0) ASSEMBLY OF TUBE SECTIONS

⚠ CAUTION

CUT HAZARD

Sheet metal parts, particularly reflectors and vent have sharp edges. Always use gloves when handling.

Failure to do so may result in death, serious injury or property damage.

During field assembly of the heater body sections, the recommended procedure is as follows:

A. Before hanging heater sections, first determine the actual layout of the system (see Sections 7.0) for details). Consideration must also be taken for flue pipe, fresh air ducting, gas piping, clearances to combustibles, etc. before hanging heater. Typical suspension methods are shown in Section 7.0).

B. Install suspension per spacing shown in Section 9.0).

1. Space tube support/hanger brackets with firing tubes as shown. Note: Welded seam of tubes must be positioned on bottom side as shown.

2. Secure tube support/hanger brackets to firing tubes using U-bolt clamps and 5/16-18 hex nuts supplied in the fastenings pack.

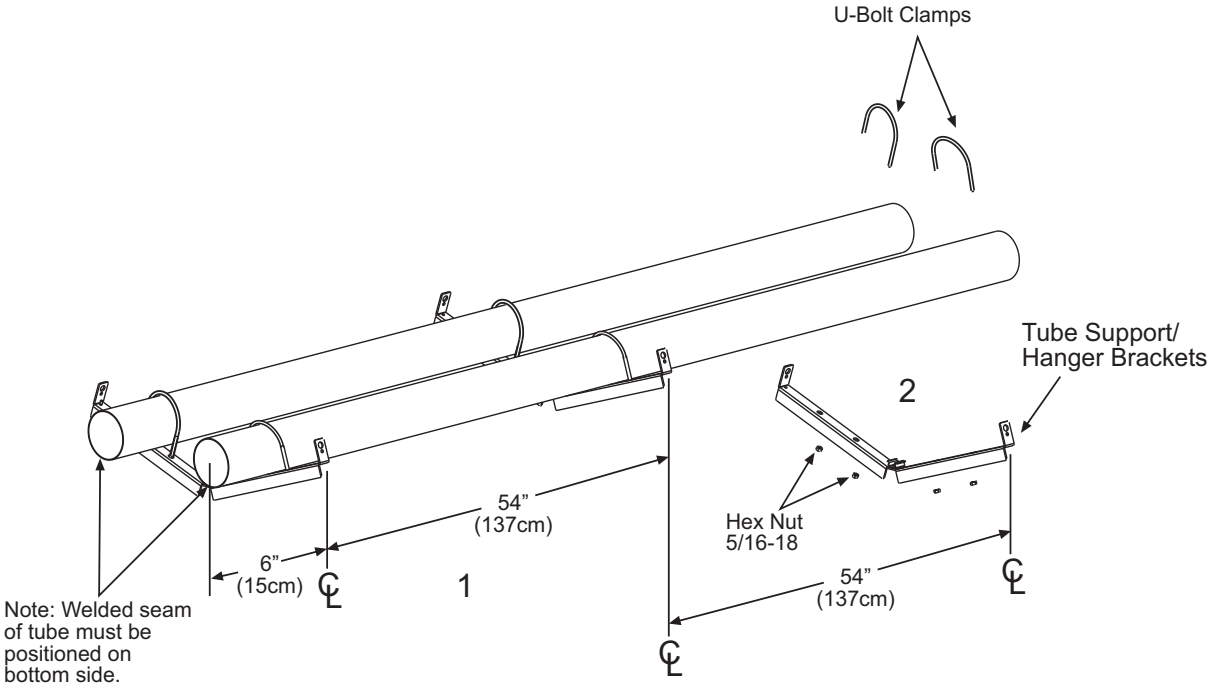


Fig. 7

10.1) ASSEMBLY OF U-BEND

1. Slide the **U-bend** onto ends of each **tube**, ensuring that they are fully engaged. Fasten the **U-bend** to each **tube** using #10 x ½" self-drill screws as shown in **DETAIL-A.**

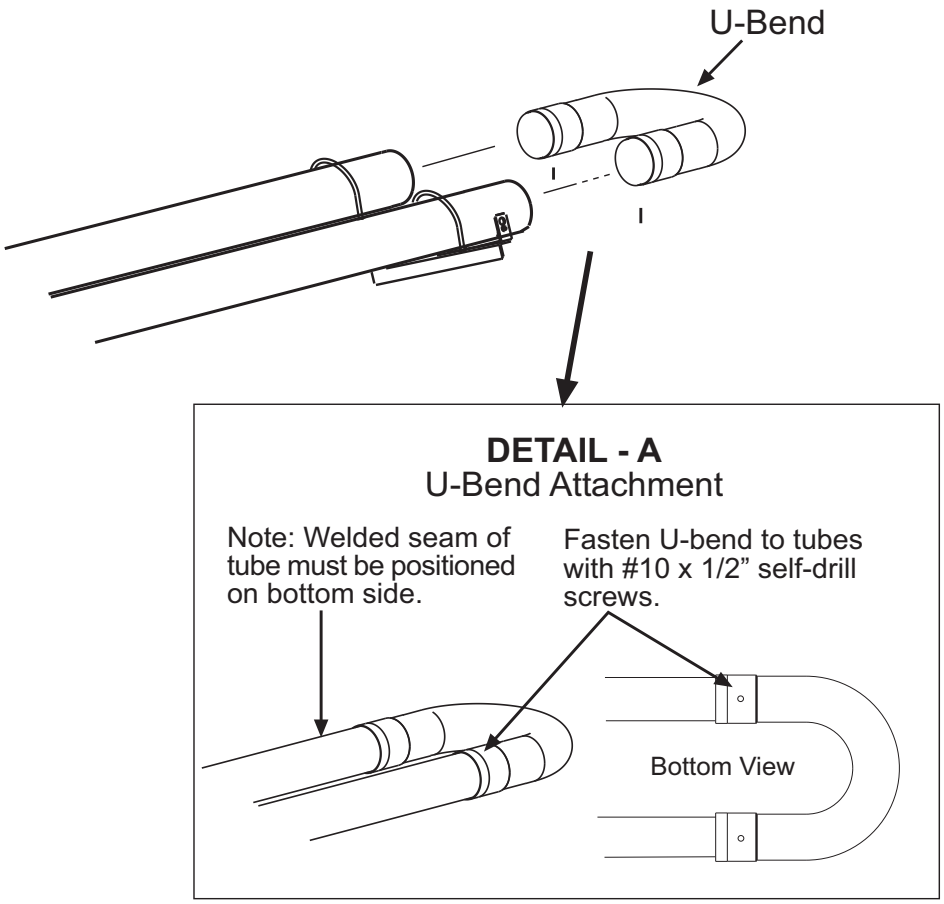
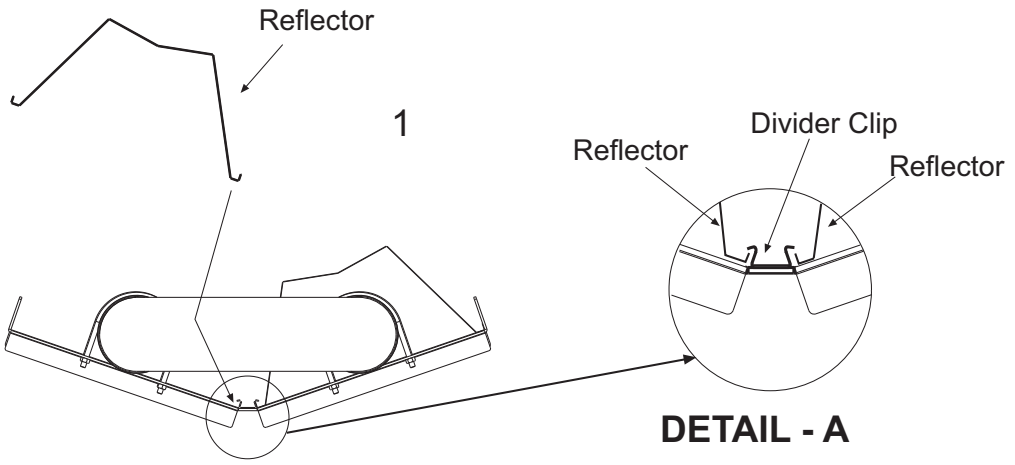
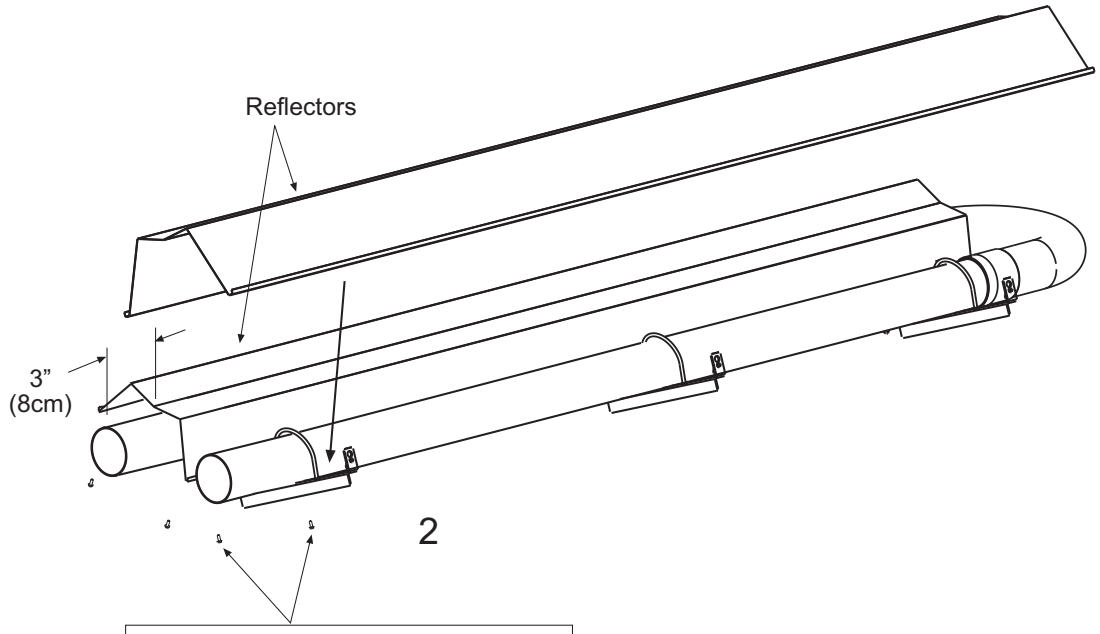

U-Bend
DETAIL - A
U-Bend Attachment
Note: Welded seam of tube must be positioned on bottom side.
Fasten U-bend to tubes with #10 x 1/2" self-drill screws.
Bottom View

Fig. 8

10.2) ADDING MAIN BODY REFLECTORS

1. Place a main body **reflector** over one of the heater tubes. Squeeze **reflector** inward slightly and rotate until the edge flange engages with the divider clip of each hanger bracket as shown in **DETAIL-B.**
2. Slide end of **reflector** until it is 3" (8cm) from end of tube as shown below. Fasten reflector to the first hanger bracket using (2) #10 x ½" self-drill screws. **See DETAIL-C.** Repeat installation steps 1 and 2 for remaining **reflector**.





DETAIL - B

Fasten reflector to this hanger bracket only using #10 x 1/2" self-drill screws. (Qty 2 each per reflector)

Fig. 9

10.3) ADDING U-BEND REFLECTORS

1. Place the **U-bend reflector** over the main body reflectors. Adjust the overlap to 12" (25cm) as shown. Secure the **U-bend reflector** to the main body reflectors with (2) #10 x ½" self-drill screws on each side. Mount the **reflector clamps** per **DETAIL-D** on each side of the tube support/hanger brackets.

⚠ WARNING **The reflector clamps MUST be installed per reflector clamp installation detail which allows the reflector to slide under the clamp during heater operation.**

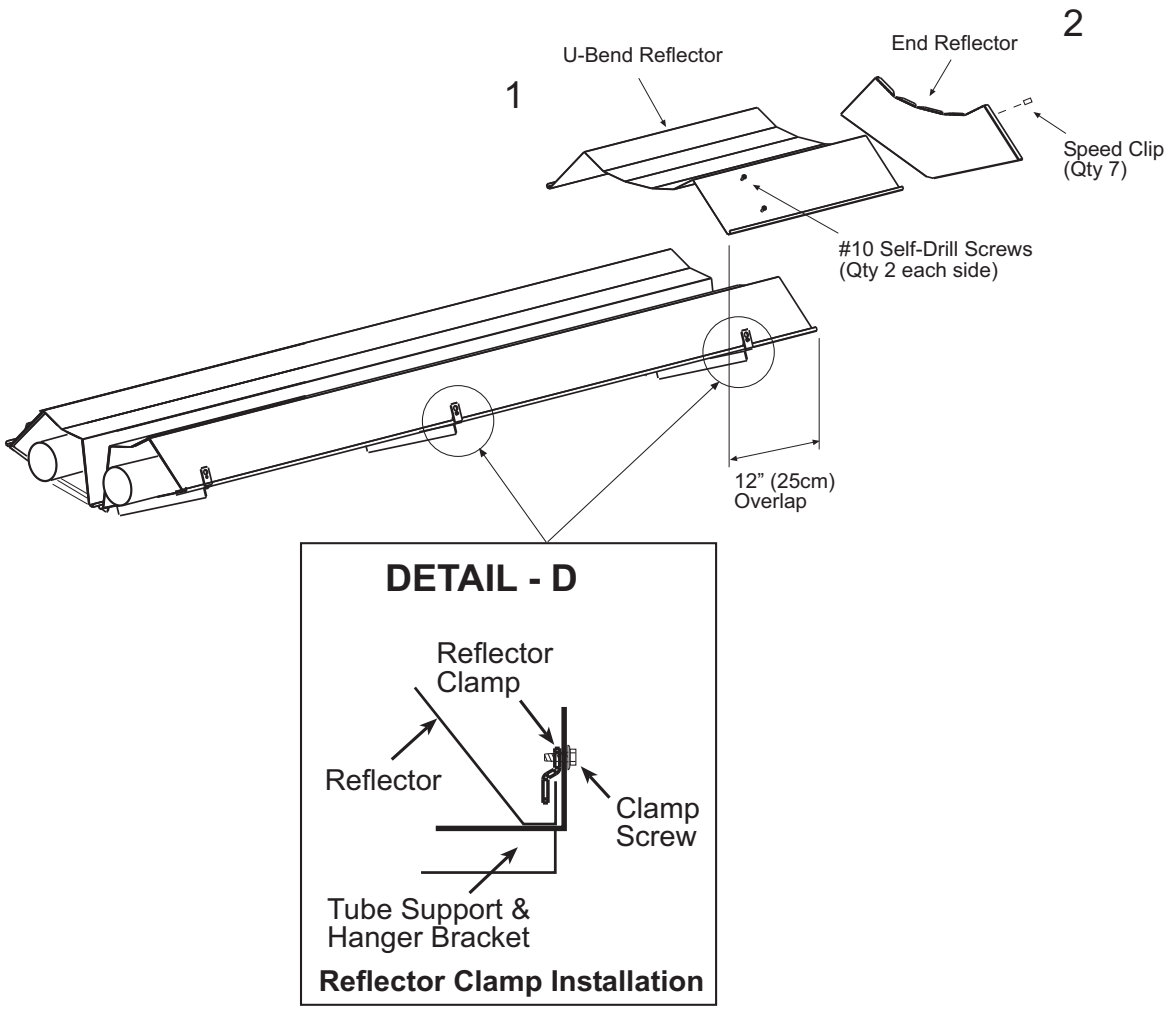


Fig. 10

2. Place the **end reflector** flush with the **U-bend reflector**. Secure by sliding speed clips onto the **end reflector** edges. Evenly space the speed clips on the sides (two each side) and top (three each) of the reflectors to provide a snug fit.

10.4) ADDING END REFLECTORS

1. Place each **end reflector** flush with the main body reflectors. Secure by sliding speed clips onto the **end reflector** edges. Evenly space the speed clips on the sides (two each side) and top (two each) of the reflectors to provide a snug fit.

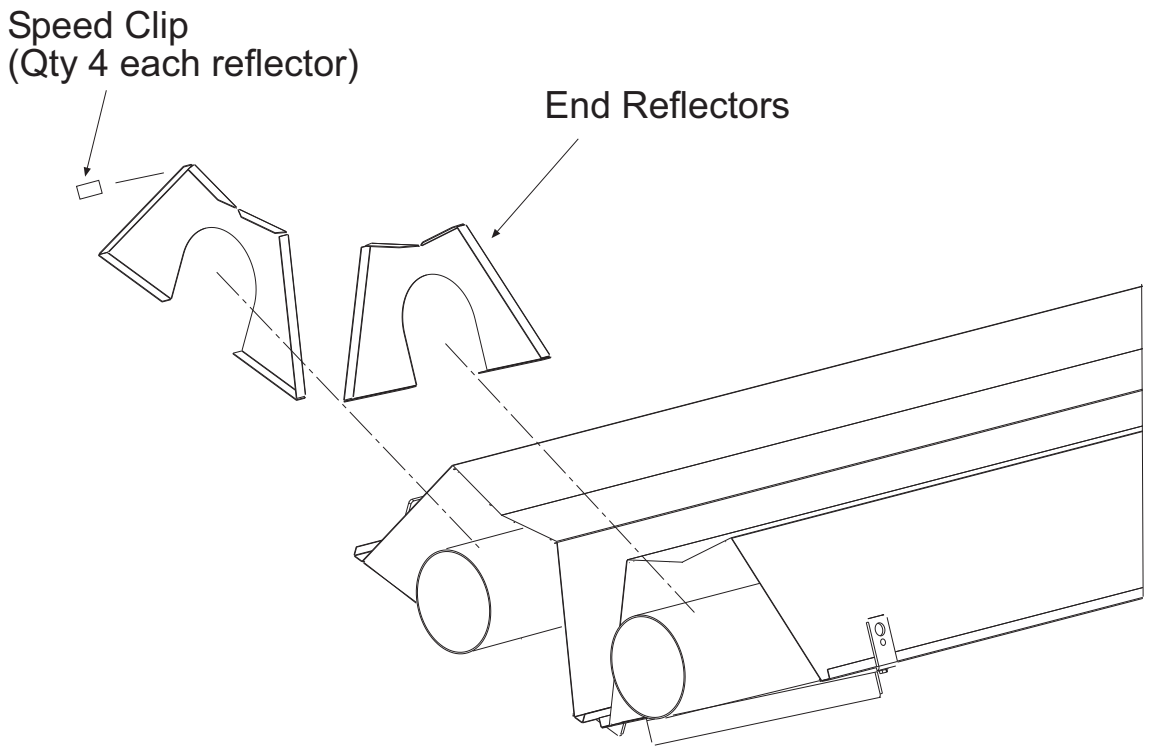
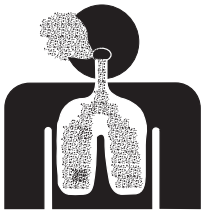


Fig. 11

10.5) INSERTING TURBULATORS – EXHAUST TUBE

⚠ WARNING



POISONOUS GAS AND SOOT HAZARD

The heater must be assembled with the correct number of turbulator sections and tube length for the rated heat input.

The turbulator must be installed in the last tube section as shown.

Failure to do so may result in death, serious injury, property damage or illness from Carbon Monoxide poisoning.

1. Assemble the **turbulators** together by interlocking the slotted end portions. Slide these into the secondary exhaust tube section until they are flush with the tube end.

   Note: Refer to the table below for quantities of **turbulators** required for each heater model.

MODEL	610mm Turbulator Sections
SBF 25	2

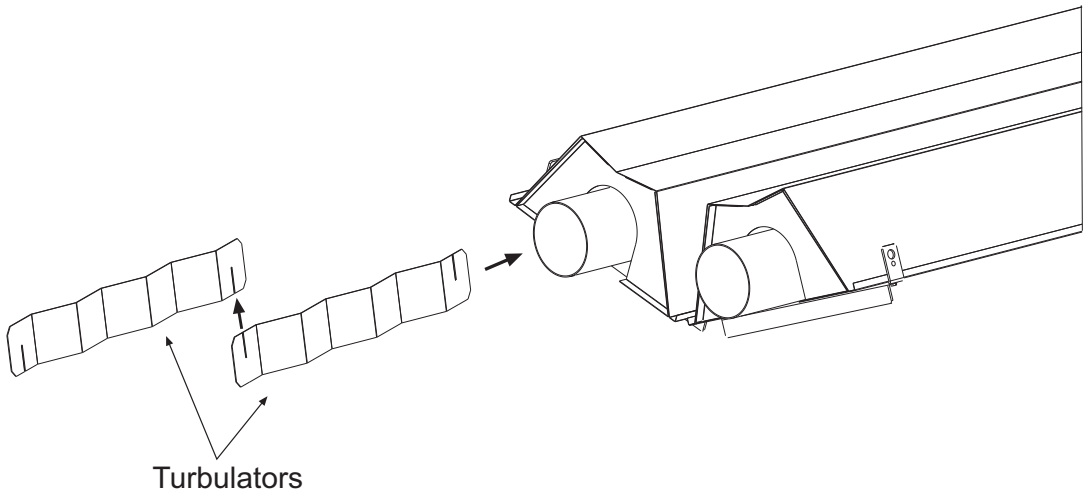


Fig. 12

11.0) ATTACHING CONTROL BOX ASSEMBLY

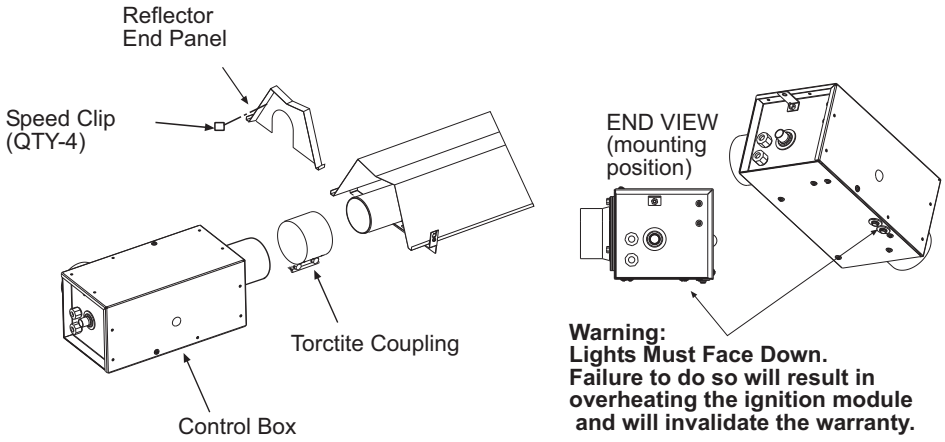


Fig. 13

1. Place a Torctite Coupling over the end of the Radiant Tube (see Fig. 13) ensuring that it engages fully, up to the stop. Assemble the Control Box to the Radiant Tube ensuring that it engages fully into the Torctite Coupling (up to the stop) and is positioned vertically. Tighten the nuts of the Torctite Coupling to secure the Control Box to the Radiant Tube, taking care to support the Control Box in line with the axis of the tube.

   NOTE: Tighten the Torctite Coupling screws alternately while continually checking for slackness of the joint.

2. Assemble the end reflector flush with the end of the main body reflector. Secure by sliding speed clips onto the reflector edges. Evenly space the speed clips on the sides (one each side) and top (two required) of the reflectors to provide a snug fit. Leave a 197mm space between the end reflector and the control box assembly.

   Repeat the procedure to attach the second Reflector End Panel to the opposite end of the Reflector.

3. The control box must be supported with a welded chain after overall heater suspension is complete. This is to prevent control box from sagging and burning tube out prematurely. Assemble bracket and turnbuckle to inlet end of control box as shown.

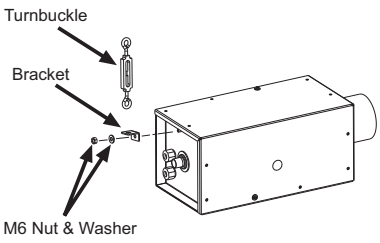


Fig. 14

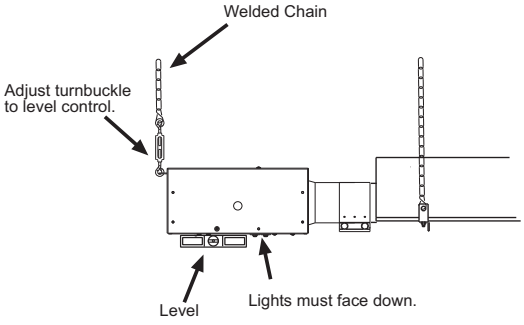


Fig. 15

4. Adjust the turnbuckle until control box is level. Use a levelling device to verify.

⚠ CAUTION

Failure to install the burner box suspension chain vertically will void the manufacturers warranty.

12.0) ATTACHING FAN ASSEMBLY

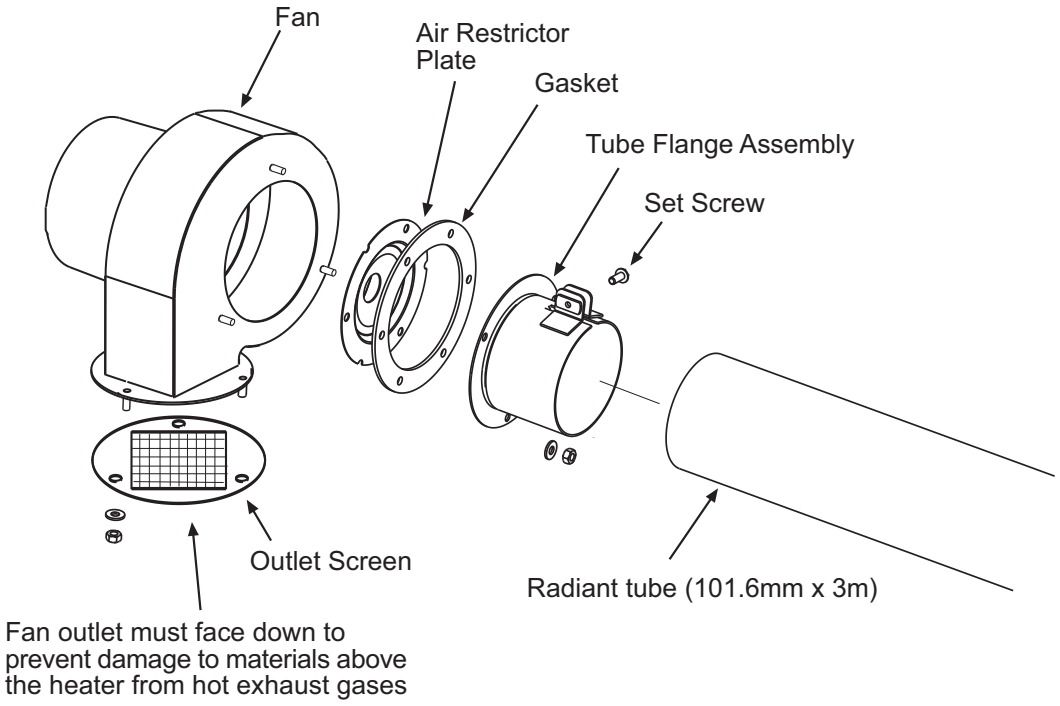

Fan
Air Restrictor Plate
Gasket
Tube Flange Assembly
Set Screw
Outlet Screen
Radiant tube (101.6mm x 3m)
Fan outlet must face down to prevent damage to materials above the heater from hot exhaust gases

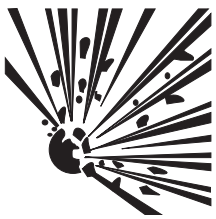
Fig. 16

1. Assemble the Fan Assembly to the Radiant Tube and position the fan outlet pointing downwards for flueless applications. Secure the Fan Assembly to the Radiant Tube by tightening the set screw, taking care to support the Fan Assembly in line with the axis of the tube.

   IMPORTANT: Failure to assemble the Radiant Tubes with their welded seams facing downward will void the manufacturer's warranty.

13.0) GAS CONNECTIONS AND REGULATIONS

⚠ WARNING



FIRE AND EXPLOSION HAZARD

Tighten flexible gas hose and components securely.

Flexible metal gas hoses must be installed without any twists or kinks in them. The hose will move during operation of the heater and it can crack if it is twisted.

Failure to do so may result in death, serious injury or property damage.

IMPORTANT BEFORE CONNECTING THE GAS TO THE HEATER

1. Connect to the supply tank or manifold in accordance with state or local building codes. Authorities having jurisdiction should be consulted before the installation is made.
2. Check that the gas fuel on the burner rating plate matches the fuel for the application.
3. Check that the gas supply piping has the capacity for the total gas consumption of the heaters and any other equipment connected to the line.
4. Check that the calculated supply pressure with all gas appliances and heaters operating will not drop below the minimum supply pressure required for these heaters. Check inlet supply pressures on Section 14.0).
5. All gas supply lines must be located in accordance with the required clearances to combustibles from the heater as listed on the clearances label of the heater and Section 4.0) of this manual.
6. Pipe joint compounds must be resistant to the action of liquefied petroleum gases.

7. Tube heaters will expand/contract during operation. Use an approved flexible connector for connections between the rigid piping and the heater. A union should be installed before the control box inlet. An approved shut off valve should be installed within 1.8m of the union.
8. The gas pipe, flexible hose and connections must be self-supporting. The gas pipe work must not bear any of the weight of the heater or any other suspended assembly.
9. This appliance is equipped with a step-opening, combination gas valve. **The maximum supply pressure to the appliance is 60 mbar.** If the line pressure is more than the maximum supply pressure, then a second stage regulator which corresponds to the supply pressure must be used.
10. After all gas connections have been made, make sure the heater and all gas outlets are turned off before the main gas supply is turned on slowly. Turn the gas supply pressure on and check for leaks.
11. If a 2nd stage regulator is used, the ball valve down-stream in the supply line must be closed when purging the gas lines to prevent gas seeping through it. If initial gas pressure is higher than 60 mbar the redundant combination gas valve is designed to lock out. Pressure build-up in the supply lines prior to the heater must be released before proper heater operation.

⚠ WARNING **Do not use an open flame of any kind to test for leaks.**

KEY DIMENSIONS AND COMPONENTS OF THE GAS CONNECTIONS

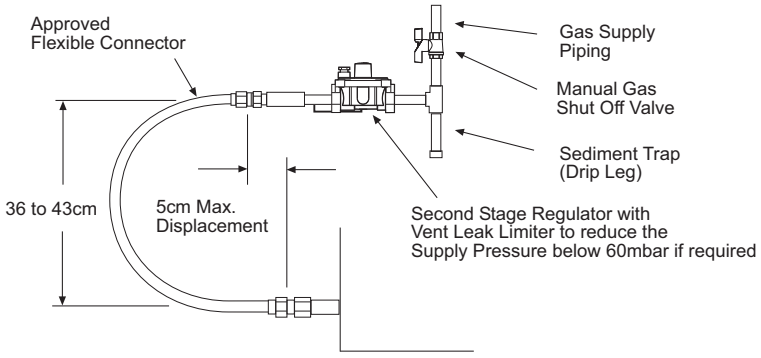


Fig. 17

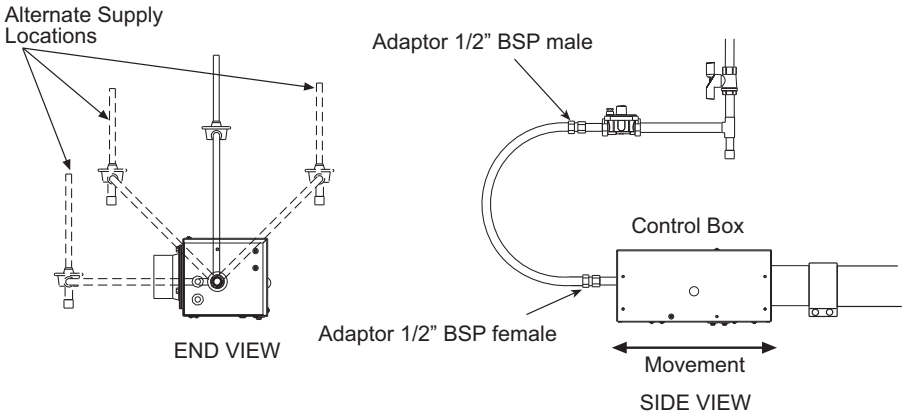


Fig. 18

INCORRECT POSITIONS

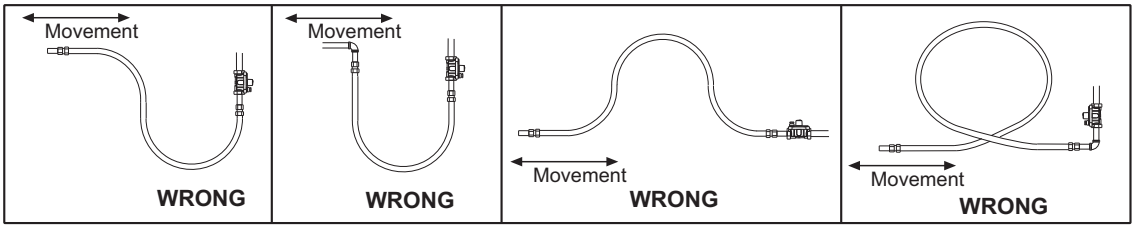


Fig. 19

Radiant tube heaters will expand and contract during operation. Therefore it is essential to provide a flexible hose, which must conform, to national or Local Regulations, to connect the appliance to the gas supply. Minimum size to be 12.7mm bore.

The gas pipe, flexible hose and connections must be self-supporting. The gas pipe work must not bear any of the weight of the heater or any other suspended assembly.

12. Natural Gas - G20 at 20mbar nominal supply pressure (appliance cat 2H).

Maximum supply pressure (Pmax)	25mbar
Minimum supply pressure (Pmin)	17mbar
Setting pressure	12.5mbar
Gas connection	R - ½

13. Check that the gas fuel on the burner data plate matches the fuel for the application.
14. LPG - G31 at 37mbar nominal supply pressure (appliance cat. 3P).

Maximum supply pressure (Pmax):	G31 - 45mbar
Minimum supply pressure (Pmin):	G31 - 27mbar
Setting pressure	25mbar
Gas connections:	R - ½

15. The complete installation MUST be tested for soundness in accordance with National or Local Regulations.

⚠ WARNING **Do not use an open flame of any kind to test for leaks.**

14.0) INSTRUCTIONS FOR PRESSURE TEST GAUGE CONNECTION

CHECKING GAS PRESSURES

1. Switch off the electricity supply to the appliance.
2. Connect a manometer to the test nipple protruding from the rear panel of the Control Box (adjacent to the Air Inlet Adaptor). See Fig. 20
3. Open the Control Box door by removing the screws, care must be taken not to lose the rubber sealing washers.

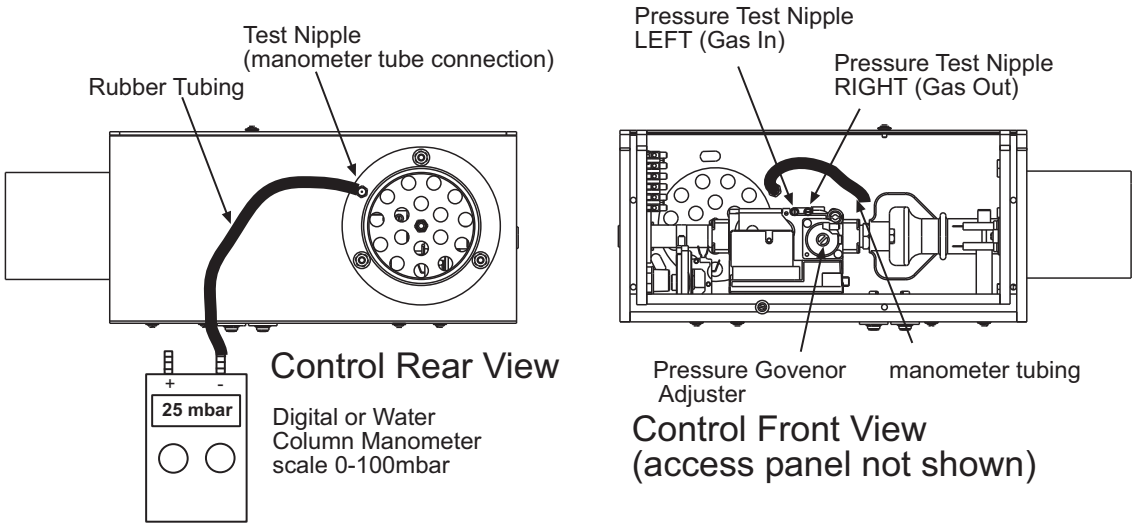


Fig. 20

TO CHECK THE GAS SUPPLY PRESSURE

1. Unscrew the sealing screw (two turns) of the LEFT (Gas IN) Control Valve test nipple and connect the free end of the manometer tube (permanently connected to the manometer test nipple inside the side panel of the control box) to this test nipple (See Fig. 20). Close the control box door and secure with the rubber washers and screws.
2. Ignite the appliance burner by switching on the electricity supply to the appliance and check that the manometer reading is as stated below for the gas type the appliance is "adjusted for" (see the Data Label affixed to the Control Box door).

category 2H: gas type G20 (natural): supply pressure	20mbar nom
	17mbar min
	25mbar max
category 3P: gas type G31 (propane): supply pressure	37mbar nom
	27mbar min
	45mbar max

3. Switch off the electricity supply to the appliance open the control box door and remove the manometer tube from the LEFT (Gas IN) control valve test nipple. Screw in the test nipple sealing screw.

TO CHECK THE BURNER SETTING PRESSURE

1. Unscrew the sealing screw (two turns) of the RIGHT (Gas OUT) Control Valve test nipple and connect the free end of the manometer tube (permanently connected to the manometer test nipple inside the side panel of the control box) to this test nipple (See Fig. 20). Close the control box door and secure with the rubber washers and screws.
2. Ignite the appliance burner by switching on the electricity supply to the appliance and check that the manometer reading is as stated below for the gas type the appliance is adjusted for (see the Data Label affixed to the control box door).

Category 2H: gas type G20 (natural): setting pressure	12.5mbar
Category 3P: gas type G31 (propane): setting pressure	25mbar

3. In the event that the burner setting pressure is incorrect, switch off the electricity supply to the appliance and remove the cap from the integral pressure governor for the Control Valve (see Fig. 20). Close the control box door and switch on the electricity supply to the appliance to ignite the burner. Remove the plug from the control box door and insert a suitable screwdriver through the exposed hole in the box to locate the governor adjusting screw. Adjust the pressure by turning the pressure governor adjusting screw clockwise to increase or anti-clockwise to decrease the burner setting pressure. See Fig. 21.

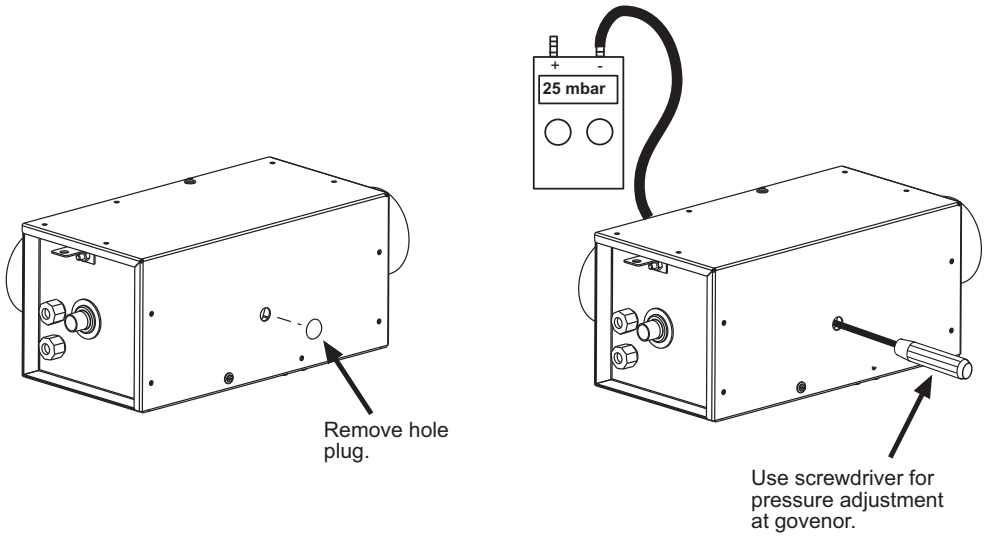


Fig. 21

4. Upon obtaining the correct burner setting pressure switch off the electricity supply to the appliance, remove the screwdriver, replace the plug into the boss in the upper surface of the control box door and open the door. Remove the manometer tube from the RIGHT (Gas OUT) Control Valve test nipple and screw in the test nipple sealing screw. Close the control box door and secure with the rubber washers and screws.

FLAME SUPERVISION

1. To check the operation of the flame supervision equipment, run the appliance normally, turn off the gas supply at the gas isolation valve and observe that the amber neon indicator remains illuminated.
2. After a purge period of 10 seconds (minimum) the solenoid valves and the ignition spark electrode will be re-energized and with the gas still turned off, the ignition control will go to "lockout" condition after a further 12 seconds (maximum). Amber neon indicator extinguished.
3. Switch off the electricity supply to the appliance for a period of 10 seconds before attempting to re-ignite the burner. (see Section 15.0).

STEP OPENING PRESSURE SETTING

1. Switch off the electricity to the appliance, open the control box door and locate the step opening setting dial (see Fig. 22).
2. Remove the black cap and check the red arrow position. For 2H G20, the arrow should be aligned with MIN; for 3P G31, it should be aligned with dot 4. If the setting is not correct, use a suitable screwdriver to set the arrow to the correct position.
3. After setting, recap the black cap.

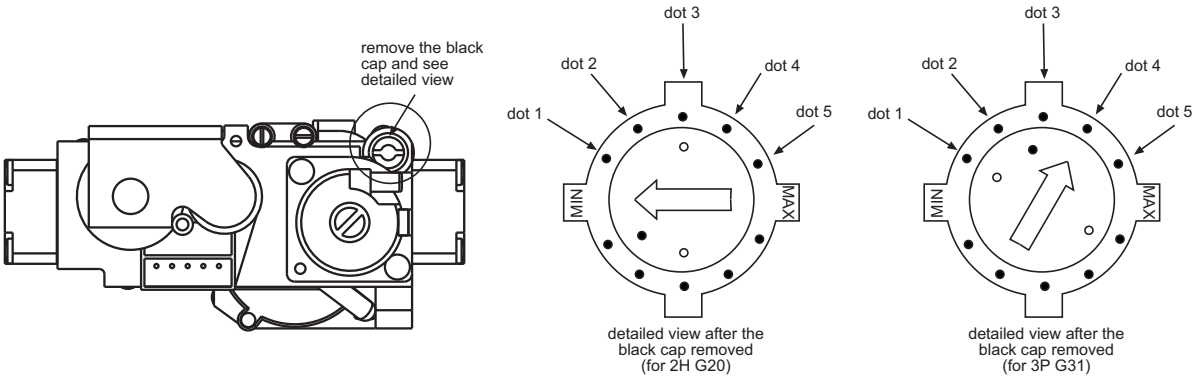
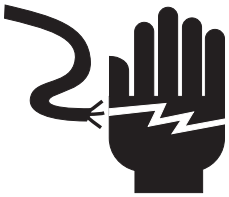

remove the black cap and see detailed view
dot 1
dot 2
dot 3
dot 4
dot 5
MIN
MAX
detailed view after the black cap removed (for 2H G20)
detailed view after the black cap removed (for 3P G31)

Fig. 22

15.0) ELECTRICAL CONNECTIONS

⚠ WARNING



ELECTRIC SHOCK HAZARD

Disconnect electrical power and gas supply before servicing.

This appliance must be connected to earth.

Failure to do so may result in death or serious injury.

1. The electrical wiring to this heater must be installed in accordance with the latest or current National Regulations and any Local Regulations, which apply.

Electrical supply	230V~50Hz 125W
Current rating	0.55
Fuse externally	3A

Important: for the correct function of the appliance, the polarity of the electrical supply MUST be correct.

The diagram below shows the physical terminal block location in the housing.

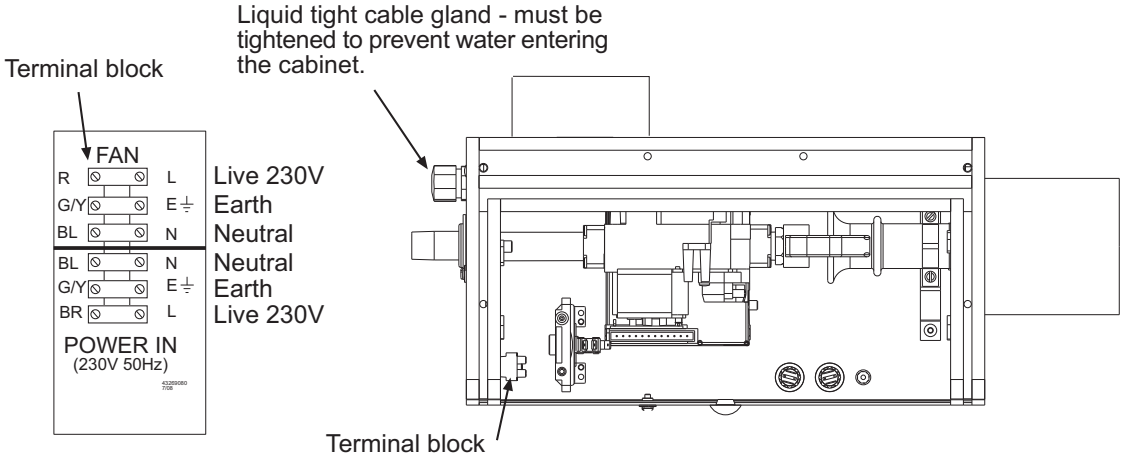
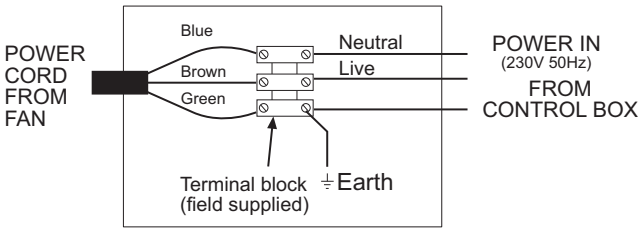


Fig. 23

The diagram below shows a field supplied IP55 junction box for connecting the power to the fan.



IP55 Junction Box (field supplied)

Fig. 24

2. Twin core and earth PVC covered flexible supply cable (0.5mm 2-to National or Local standard specification) must be used, with connection made as follows:

Single Heaters per Thermostat connection diagram

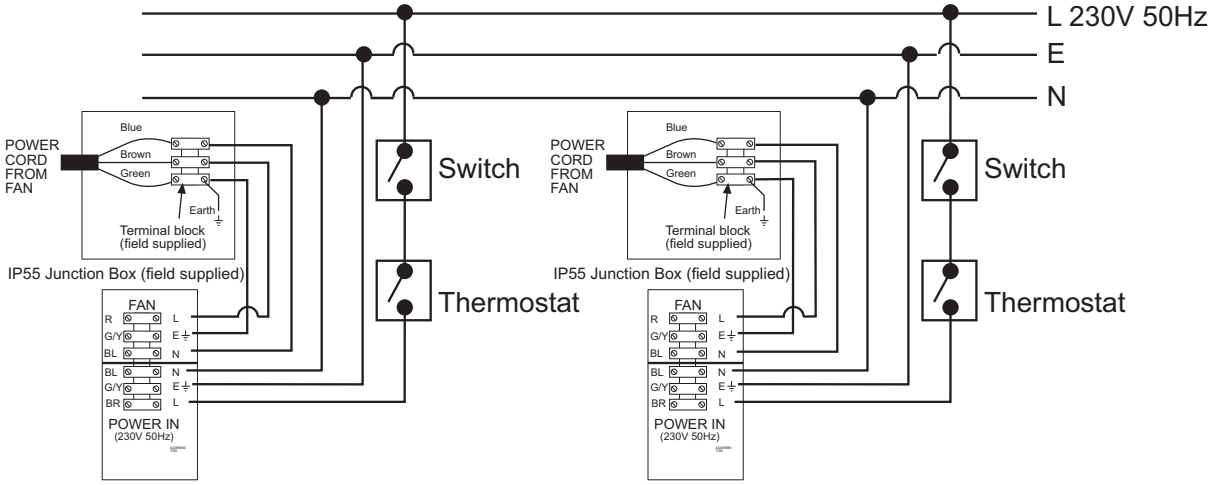


Fig. 25

Multiple Heaters per Thermostat connection diagram

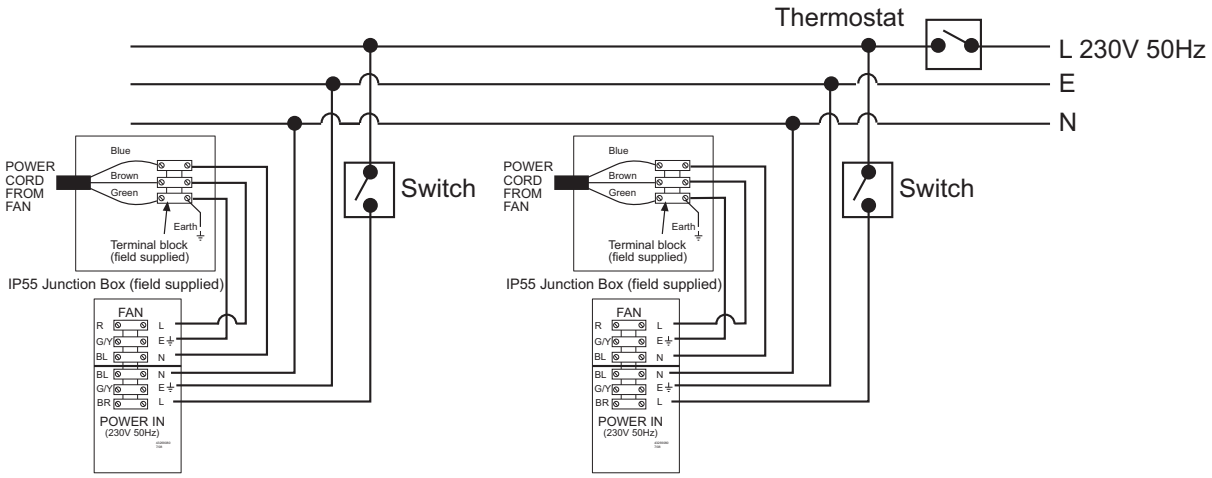


Fig. 26

Notes: The method of connection to the electrical supply must facilitate complete isolation and should preferably be via a fused double pole isolator having a constant separation of at least 3mm in all poles and supplying the appliance ONLY.

Alternatively, connection may be made via a fused 3 pin plug and un-switched, shuttered socket, both complying with the requirements of National or Local Regulations. Neither thermostat nor switch are supplied as standard equipment.

NOTE: In the event of an electrical fault after installation of the appliance, preliminary system checks are required to be carried out i.e. earth continuity, polarity and resistance to earth.

3. Internal Wiring Diagram

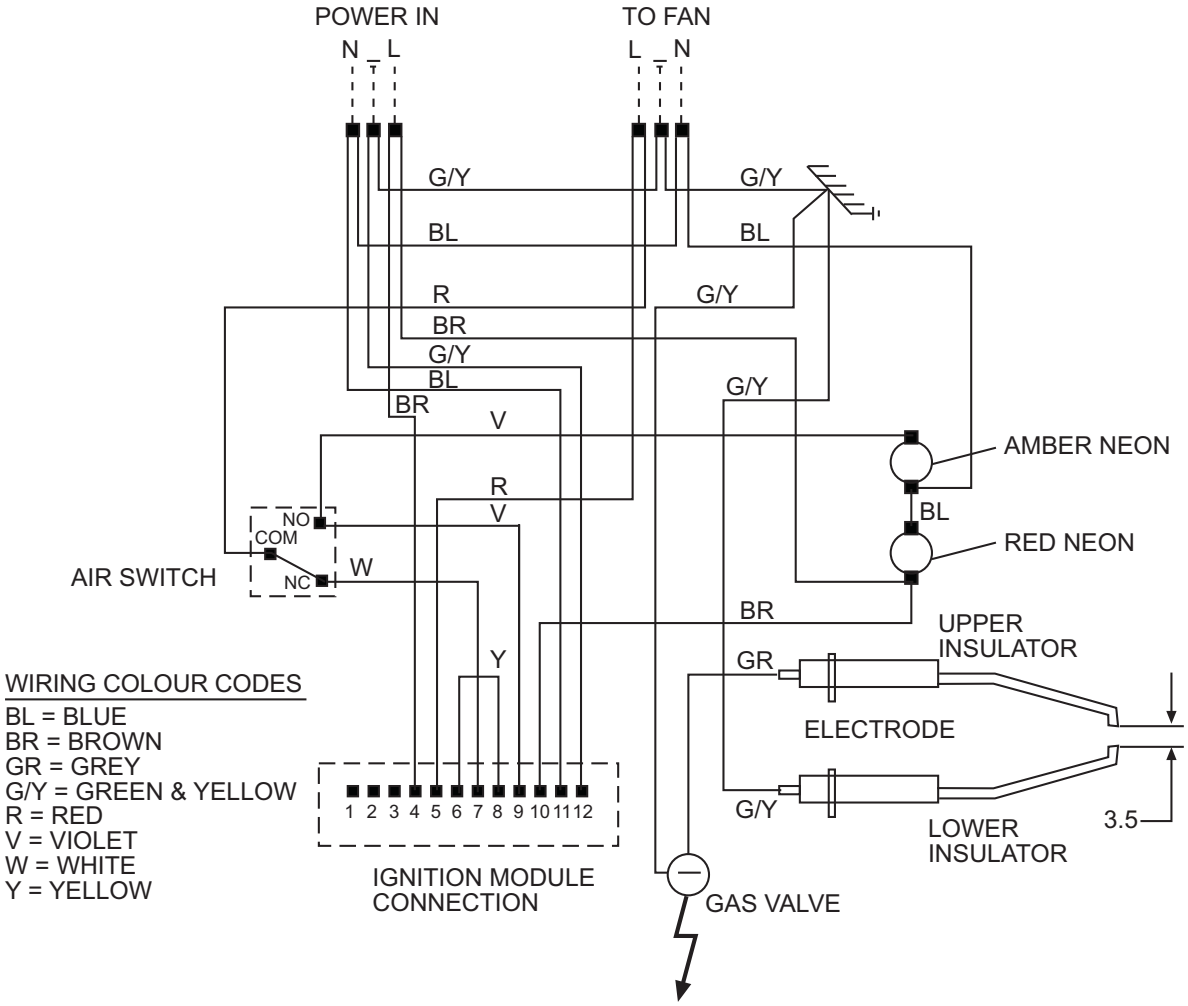
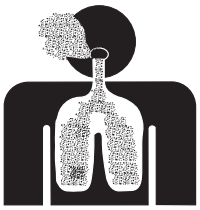


Fig. 27

16.0) VENTING AND FRESH AIR FOR COMBUSTION

⚠ WARNING



POISONOUS GAS AND SOOT HAZARD

Heaters installed unvented must be installed in an area with at least $10m^3$ / hr per kW heat input of outside air ventilation.

In buildings with airborne contamination such as poultry houses the heater must be installed with fresh air for combustion.

Failure to do so may result in death, serious injury, property damage or illness from Carbon Monoxide poisoning.

These appliances may be installed with an exhaust flue fitted **or** without an exhaust flue fitted.

A. FLUELESS (UNFLUED)

The installation room should have a volume of at least 10m≥/kw of installed nominal heat input of the radiant heater.

The ventilation requirements and calculation methods for unflued appliances are set out in the European Standards **EN 13410:2001** and must be applied. The following is guidance to the standard:

Ventilation may be achieved by any of the three following different means:

Thermal evacuation of the products of combustion/air mixture

Mechanical evacuation of the products of combustion/air mixture

Natural air change

VENTILATION BY THERMAL EVACUATION

1. Ventilation by thermal evacuation is sufficient if **10m≥/h of exhaust air per kW of operating heat input** are ventilated out of the installation room.
2. The air/products of combustion mixture must be evacuated above the radiant heaters, if possible near the ridge, by means of exhaust mixture opening(s), (vents).
3. Where the exhaust mixture opening(s) can be closed, it shall only possible to operate the radiant heaters when they are open.
4. The maximum horizontal distance between a radiant heater and a vent opening shall be:

   6 (six) times the vent height in the case of wall openings

   3 (three) times the vent height in the case of roof openings

VENTILATION BY MECHANICAL EVACUATION

1. Ventilation by mechanical evacuation is sufficient if 10m≥/h of exhaust air per kW of operating heat input are ventilated out of the installation room.
2. The air/products of combustion mixture must be evacuated above the radiant heaters using fan(s).
3. It shall only be possible to operate the radiant heaters whilst the exhaust airflow is proven.
4. The maximum horizontal distance between a radiant heater and a fan shall be:

   6 (six) times the fan mounting height in the case of wall openings

   3 (three) times the fan mounting height in the case of roof openings
5. Total minimum proven ventilation airflow in m≥/h will be:

   Total installed kW input X 10

Note: Mechanical exhaust air openings must be positioned such that the burner stability of the nearest appliance is unaffected.

VENTILATION BY NATURAL AIR CHANGE

Gas-fired radiant heaters may be operated without any special exhaust system if the exhaust gases are discharged to the outside atmosphere by a sufficient natural air change in the installation room.

Furthermore, no provision for thermal or mechanical ventilation is required in the following particular cases:

Buildings with natural air change greater than 1.5 volumes per hour

Buildings with a density of operating heat input not greater than 5W/m≥

AIR SUPPLY

Air supply openings are required to admit air and shall be located below the radiant heaters.

The total area of the unobstructed cross-sections of all the air supply openings shall not be smaller than the total area of the unobstructed cross-sections of all the exhaust openings.

Slits and gaps of fixed cross-section can also be used as air supply openings.

Where the air supply openings can be closed, it shall only be possible to operate the radiant heaters when they are open.

B. FLUED

If the appliance is to be flued externally, then flue pipe of diameter stated in table 4, and complying with National and Local Regulations should be used.

IMPORTANT: When flued horizontally, the flue pipe must be arranged to provide a continuous rise from the appliance of 25mm per 1m length.

The ventilation requirements for flued appliances are set out in **BS 6896:1991** and must be applied. The following is guidance to the standard:

NATURAL VENTILATION

Low level ventilation shall be provided in all cases below the level of the heater(s).

Up to and including 60kW: 4.5cm²/kW

Over 60kW: 270cm² + 2.25cm² /kW in excess of 60kW total rated heat input.

Where the air supply openings can be closed, it shall only be possible to operate the radiant heaters when they are open.

MECHANICAL VENTILATION

Ventilation shall be provided in all cases at or below the level of the heaters.

Minimum proven air flow: 2.35m³/h/kW of total rated heat input.

It shall only be possible to operate the radiant heaters whilst the ventilation airflow is proven.

C. FLUE AND COMBUSTION AIR CONFIGURATIONS

The heaters can be installed with different flue and combustion air configurations please review the diagrams on the following page for the overview of the permitted installations. The permissible maximum lengths associated with these options are listed in the table below.

Model	Flue Type	Max Combustion Air Length, m (Ø100mm)	Max Flue Length, m (Ø100mm)	Max Length Combined Combustion Air and Flue, m (Ø100mm)	Reduce length for 90° bends, m (Ø100mm)
SBF 25 IP55	A2	8	n/a	n/a	-1.7m
	B22	8	8	16	-1.7m
	C52	8	8	16	-1.7m

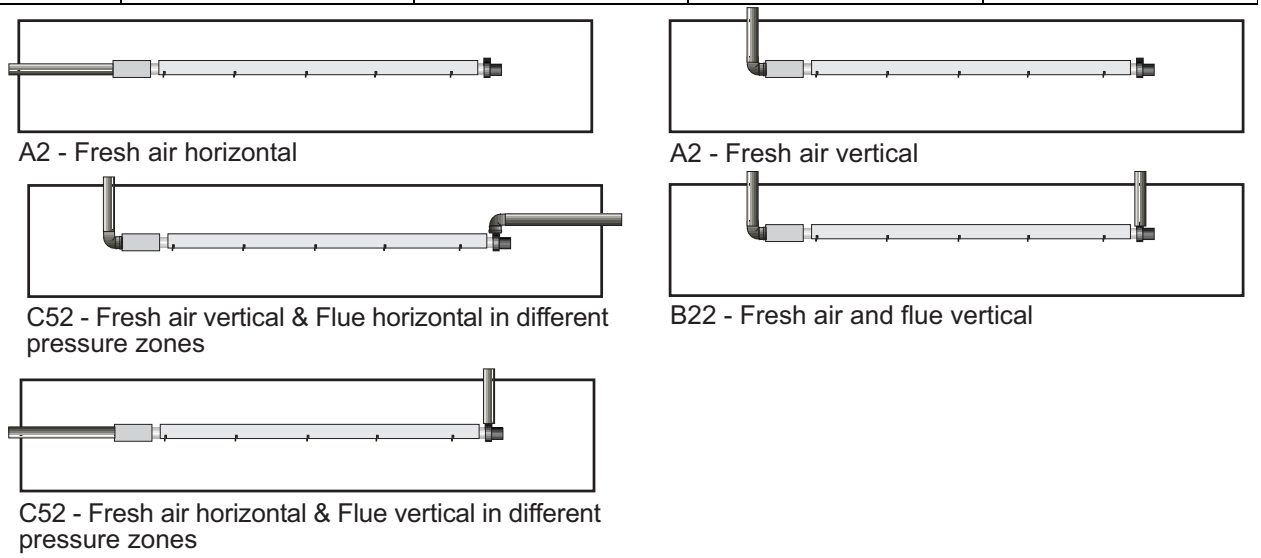

A2 - Fresh air horizontal
A2 - Fresh air vertical
C52 - Fresh air vertical & Flue horizontal in different pressure zones
B22 - Fresh air and flue vertical
C52 - Fresh air horizontal & Flue vertical in different pressure zones

Fig. 28

Type A2:

Outside (ducted) combustion air supply. The heater must be connected with a fresh air supply to meet IP55 protection requirements. The heater must have an adequate supply of clean fresh air. A length of 100mm flexible ducting should be installed between the Control Box Air Inlet and any rigid ducting and be secured to the Air Inlet with hose clips. The diagram below shows the alternatives for fresh air connection.

Fresh air connection must be sealed with silicone sealant provided.

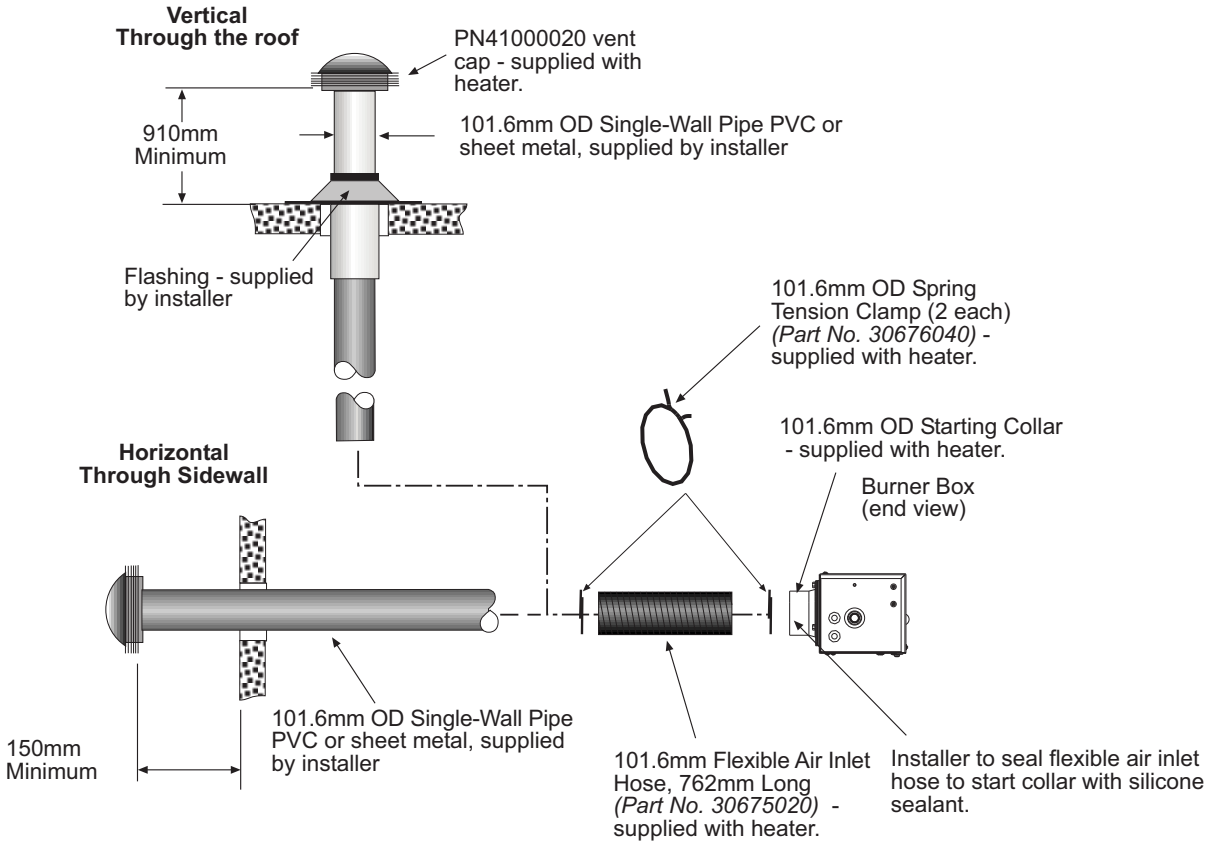
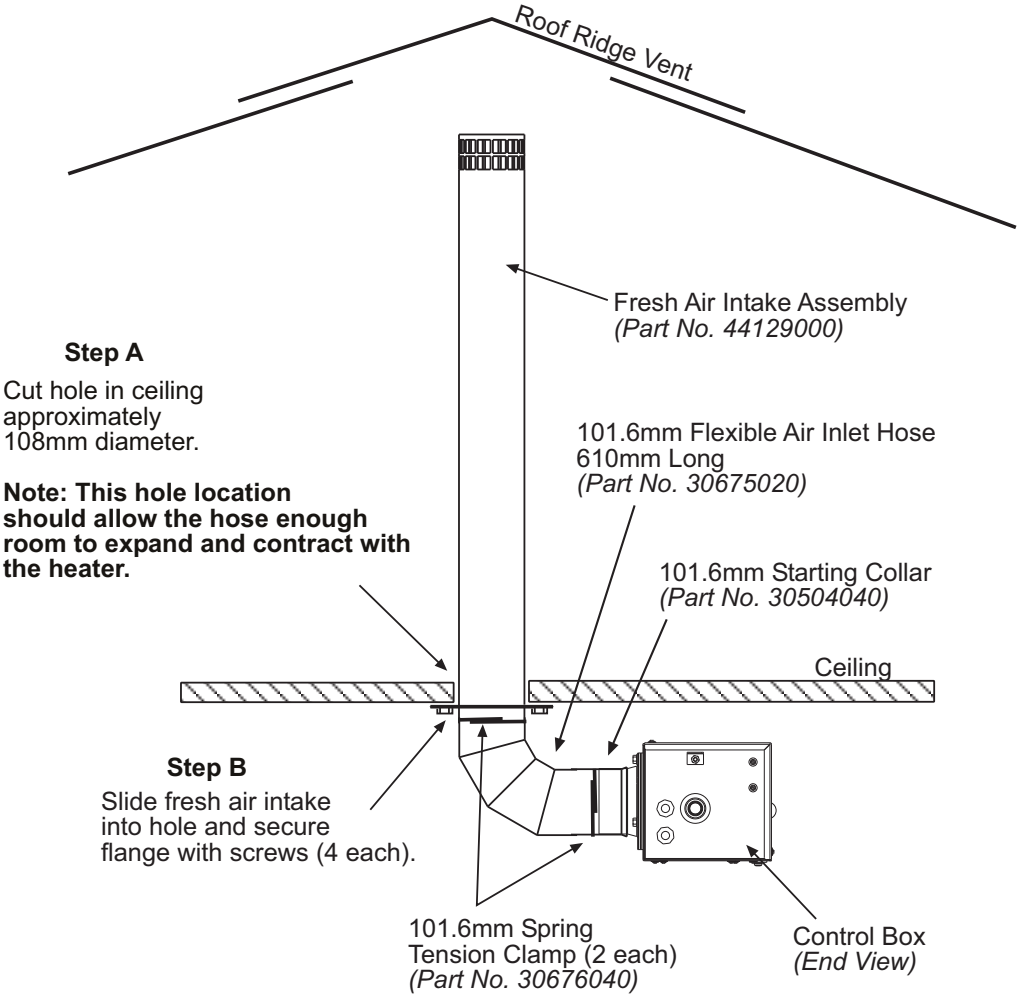
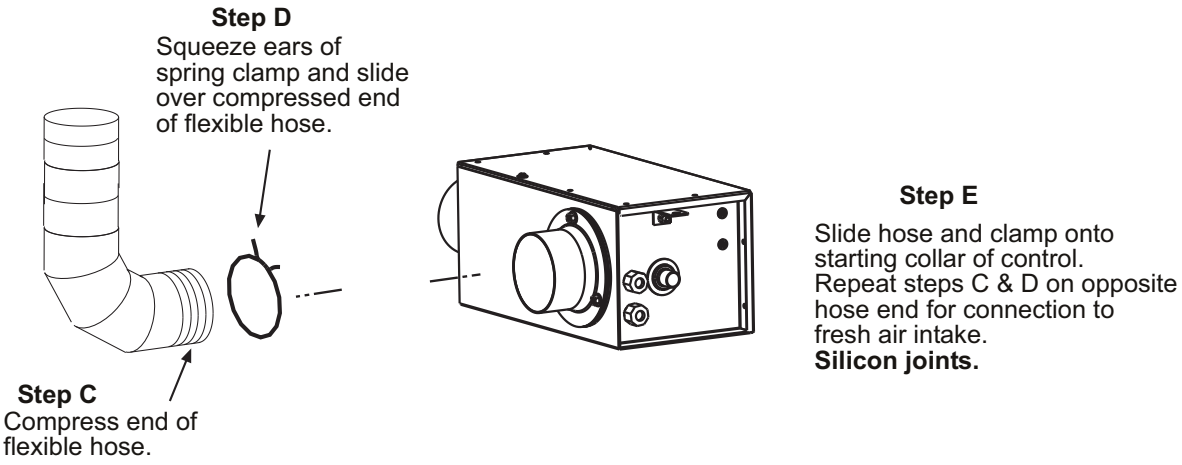

Vertical
Through the roof
PN41000020 vent cap - supplied with heater.
910mm Minimum
101.6mm OD Single-Wall Pipe PVC or sheet metal, supplied by installer
Flashing - supplied by installer
101.6mm OD Spring Tension Clamp (2 each) (Part No. 30676040) - supplied with heater.
101.6mm OD Starting Collar - supplied with heater.
Horizontal
Through Sidewall
Burner Box (end view)
101.6mm OD Single-Wall Pipe PVC or sheet metal, supplied by installer
150mm Minimum
101.6mm Flexible Air Inlet Hose, 762mm Long (Part No. 30675020) - supplied with heater.
Installer to seal flexible air inlet hose to start collar with silicone sealant.

Fig. 29

Alternative Taking Fresh Air from the Attic


Roof Ridge Vent
Fresh Air Intake Assembly
(Part No. 44129000)
Step A
Cut hole in ceiling approximately 108mm diameter.
Note: This hole location should allow the hose enough room to expand and contract with the heater.
101.6mm Flexible Air Inlet Hose 610mm Long
(Part No. 30675020)
101.6mm Starting Collar
(Part No. 30504040)
Ceiling
Step B
Slide fresh air intake into hole and secure flange with screws (4 each).
101.6mm Spring Tension Clamp (2 each)
(Part No. 30676040)
Control Box
(End View)


Step D
Squeeze ears of spring clamp and slide over compressed end of flexible hose.
Step C
Compress end of flexible hose.
Step E
Slide hose and clamp onto starting collar of control. Repeat steps C & D on opposite hose end for connection to fresh air intake.
Silicon joints.

Type B22:

When installing external flue single duct systems with ducted combustion air supply, the distance between the flue terminal and fresh air intake shall be no less than 1 m for both vertical and horizontal systems.

Fig. 30

Type C52:

When fresh air for combustion and the flue outlet are from different pressures zones as shown in Fig. 28, the flue outlet and the fresh air intake must not be on surfaces that are 180 degrees apart. The acceptable configurations are those shown in Fig. 28 in combination with the maximum lengths listed on table above.

⚠ CAUTION

Property Damage

The flexible air inlet hose should be connected so that flexibility is provided for the expansion and contraction of the heater.

Failure to follow these instructions may result in property damage and invalidate warranties.

17.0) LIGHTING AND SHUTDOWN INSTRUCTIONS

1. Ensure that the Control Box lid is closed. The heater will not operate with the door open.
2. Turn on the gas supply to the appliance.
3. Set any time switches or thermostats to demand heat.
4. Switch on the electricity supply to the appliance. The red neon indicator and amber neon indicator will be illuminated.
5. The burner should ignite within 20 seconds. Both red and amber neon indicators will remain illuminated.
6. Failure to ignite will result in the ignition controller going to "lockout" condition. The red neon indicator will remain illuminated. The amber neon indicator will be extinguished.
7. If lockout occurs, switch off the electricity supply to the appliance; wait for 10 seconds before switching on the electricity supply to the appliance to repeat the ignition sequence.
8. If the appliance fails to ignite after a second sequence switch off the electrical supply to the appliance and call the service engineer.
9. If gas failure occurs after successful ignition the appliance will attempt one re-ignition before going to lockout condition.
10. To shut down the appliance for short periods of time, switch off the electricity supply to the appliance.
11. To shut down the appliance for longer periods of time, switch of the electricity supply to the appliance and turn off the gas supply at the gas isolation valve.

NOTE: The lighting and shutdown instructions are also shown on the permanent nameplate label attached to the heater control box.

18.0) COMMISSIONING

The chart below shows the sequence of operation for the normal operating cycle.

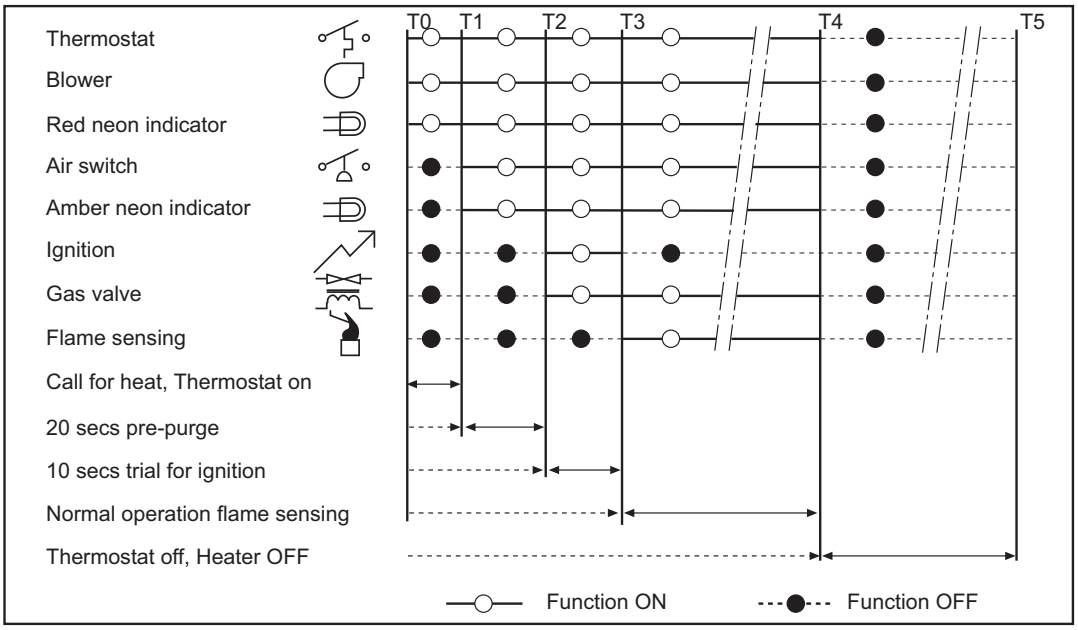


Fig. 29

If the flame is not sensed during sequence T3 then the heater will go to lockout.

It is essential that all new pipework installations are purged and tested for soundness with a suitable leak detection fluid prior to attempting to ignite any appliance. This work should be carried out in accordance with National or Local regulations.

NOTE: DO NOT TEST FOR SOUNDNESS BY USE OF NAKED FLAMES.

IGNITION

1. Close and secure the Control Box door. The appliance will not operate unless the door is secured.
2. Turn on the gas supply to the appliance.
3. Set the system time clock and thermostat to demand heat.
4. Switch on the electricity supply to the appliance. The appliance red neon indicator will be illuminated, the system fan will commence rotating and the air proving switch will sense an adequate air flow condition. The amber neon indicator will be illuminated.
5. After a purge period of 20 seconds minimum, the solenoid valves and ignition spark electrode will be energized simultaneously.
6. Upon successful ignition, the flame sensor will detect the flame, and the ignition spark electrode will be de-energized.
7. Should the flame fail to permanently establish during the 10 second ignition period the solenoid valves and ignition spark electrode will be de-energized, the amber neon indicator extinguished, the fan stop rotating, and the appliance ignition control go to "lockout" condition.
8. To repeat the ignition sequence it will be necessary to switch off the electricity supply to the appliance for a period of 10 seconds to reset the ignition control. If a first reset is not successful, wait at least 15 seconds before repeating the procedure. After reset, an extended waiting time will occur.
9. If the burner fails to ignite following a second ignition sequence, switch off the electricity supply to the appliance, turn off the gas supply at the gas isolation valve and investigate the fault.
10. If gas failure occurs after successful ignition, the appliance ignition control will attempt one re-ignition before going to "lockout" condition.

IGNITION

1. To shut down the appliance for short periods of time, switch off the electricity supply to the appliance.
2. To shut down the appliance for a period for time in excess of one week, switch off the electricity supply to the appliance and turn off the gas supply at the gas isolation valve.

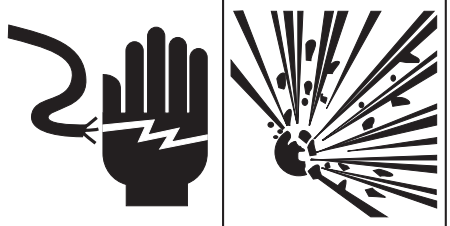
Note: Concise operating instructions are contained on Instruction Label (4260440), which should be affixed, adjacent to a low level user control.

FLAME SUPERVISION

1. To check the operation of the flame supervision equipment, run the appliance normally, turn off the gas supply at the gas isolation valve and observe that the amber neon indicator remains illuminated.
2. After a purge period of 20 seconds (minimum) the solenoid valves and the ignition spark electrode will be re-energized and with the gas still turned off, the ignition control will go to "lockout" condition after a further 10 seconds (maximum). Amber neon indicator extinguished.
3. Switch off the electricity supply to the appliance for a period of 10 seconds before attempting to re-ignite the burner. (see Section 15.0).

19.0) CLEANING AND ANNUAL MAINTENANCE

⚠ WARNING



ELECTRIC SHOCK & EXPLOSION HAZARD

Disconnect electrical power and gas supply before servicing.

Failure to do so may result in death or serious injury.

This heater must be cleaned and serviced annually by a qualified contractor before the start of each heating season and at any time excessive accumulation of dust and dirt is observed. Maximum heating efficiency and clean combustion will be maintained by keeping the heater clean.

It is essential that at least once a year, preferably before the heating season, a qualified person service the appliance. In exceptionally dirty conditions, more frequent servicing may be desirable.

IMPORTANT:

1. Do not rest anything, especially ladders, against the appliance.
2. Gas and Electricity supplies must be isolated before commencing servicing work or replacement of components.
3. Unless instructed to the contrary, re-assemble components in reverse order.
4. Check all joints for gas soundness after carrying out any servicing of the appliance.
5. On completion of a service/fault finding task which has required the breaking and remaking of electrical corrections, the following checks, using a multimeter must be made.
   a. Earth continuity check
   b. Polarity check
   c. Resistance to earth check

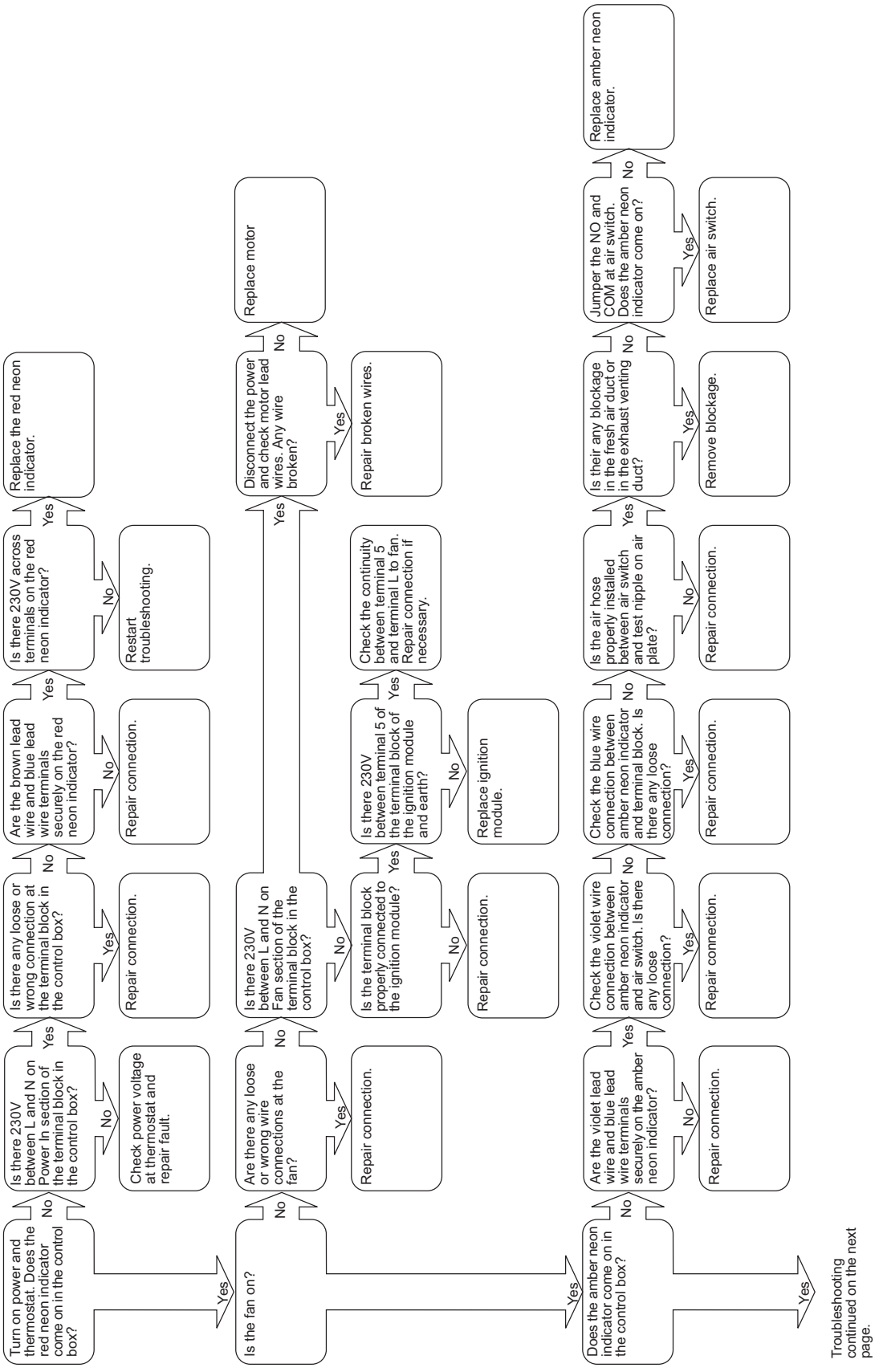
The contractor shall check the following during periodic maintenance.

- **Clearances to combustibles:** Check that clearances are being maintained. Make sure there are no flammable objects, liquids or vapors near the heater. See also Section 4.0).
- **Reflectors:** Reflectors should be kept clean, at a minimum blow off the reflectors. (Dirty reflectors will reduce heat output).
- **Heat exchanger tubes:** Inspect the heat exchanger tubes to make sure they are not cracked, sagging or showing signs of fatigue.
- **Combustion air intake:** Disconnect combustion air intake from the control box and inspect internally using a flashlight to make sure no foreign material has collected in the tubes and that there is no obstruction around the air intake openings. Clean any foreign materials. Inspect any joints to make sure they are completely sealed. See also Section 16.0).

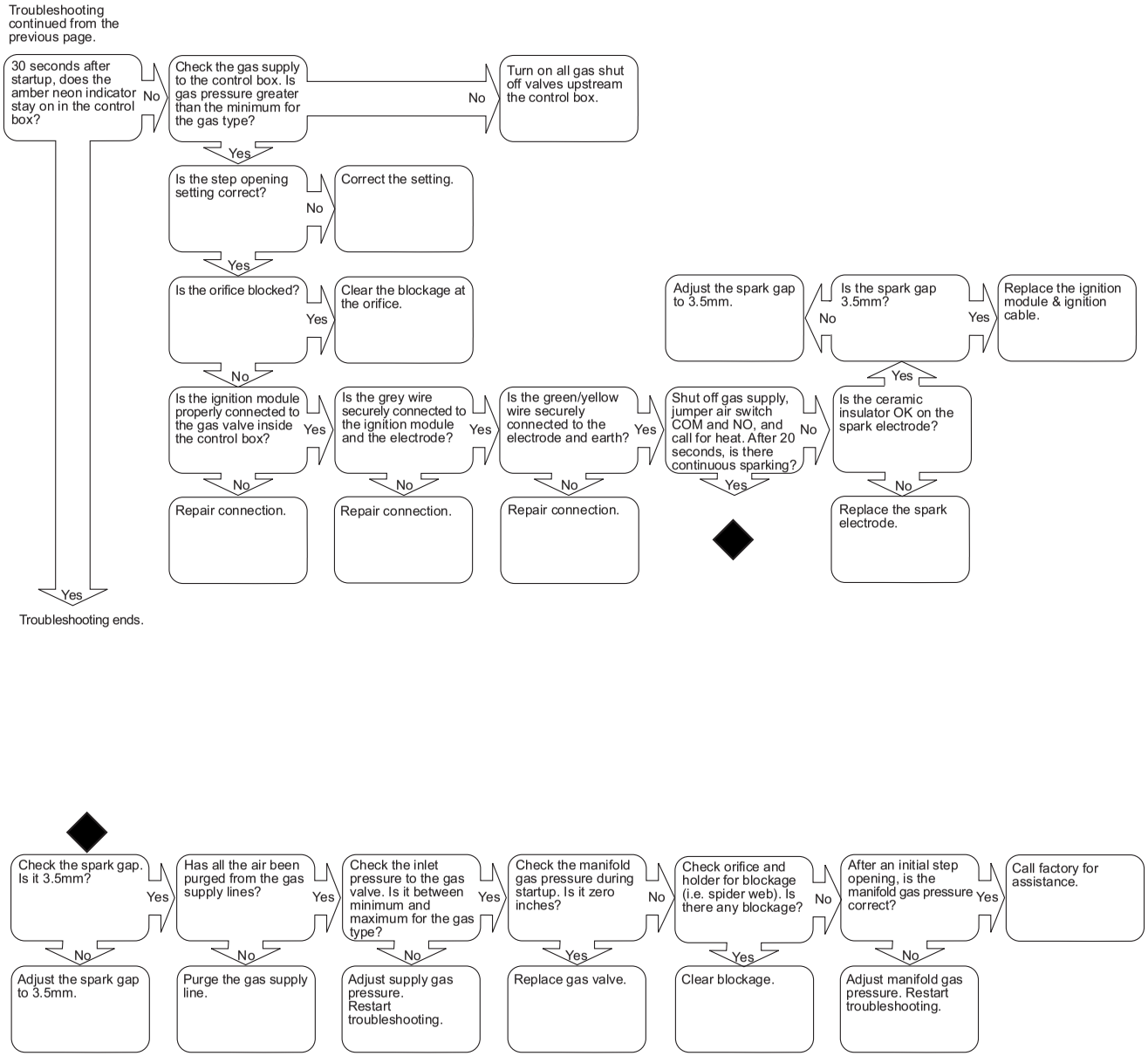
- **Venting System:** Disconnect vent pipe and inspect internally using a flashlight to make sure no foreign material has collected in the pipes. Check the external vent cap and make sure that there is no obstruction around the exhaust openings. Clean any foreign materials. Inspect any joints to make sure they are completely sealed. See also Section 16.0).
- **Gas lines:** Make sure that the gas lines are not leaking. Check the gas connection to the heater for any signs of damage, fatigue or corrosion. If there are any signs of damage to the gas connection or leaks found in the gas piping, immediately stop using the heater until the gas pipe and connections have been repaired or replaced. Check that the gas lines are not bearing the weight of the heater. See also Section 13.0).
- **Control Box:** In order to extend the longevity of the heater, the heat exchanger tube and the burner must be level. Check that the control box is level; use the turnbuckle on the burner suspension eyebolt to adjust the level of the burner. See also Section 11.0).
- **Blower wheel and housing:** Check that the blower wheel spins freely, blow out any dust or dirt with compressed air. See Section 0 for blower location.
- **Electrode condition:** Visually check that the electrode gap is maintained at 3.5mm and that the tips of the flame sensor and spark electrode are free from deposits. Clean off any deposits. Check that the electrode ceramic is free from cracks. See Section 21.1).
- **Suspension system:** Check that the suspension system is holding the heater level. Make sure that the heater is hanging securely, look for any evidence where the heater may have been hit accidentally and tighten any loose hanging points. Check that S hooks are closed. Check that there is no evidence of wear on the chain at the connection to the heater and at the ceiling.
- **Main Burner and Orifice:** Check the Main burner and orifice; remove any dirt or debris including spider webs. See Sections 21.2) and 21.3) .
- **Electrical Wiring:** Check that all the electrical connections are sound and that the wiring is undamaged. Replace damaged wires as necessary.
- **Air Inlet / Baffle Plate:** Check that the air inlet holes in the Baffle Plate, which is clamped between the Control Box side panel and the Air Inlet flange, are clear from obstructions. Check also, that the wire mesh panel of the Air Inlet is clean. Clean as necessary using a soft brush. In the case of an appliance having a ducted air supply, it will be necessary to disconnect the flexible ducting from the Air Inlet by first releasing the hose clip. If it is necessary to remove the Air Inlet to adequately clean the Baffle Plate it will be necessary to replace the gasket seal (see Section 21.8).
- **Door Seal:** Check the condition of the seal around the Control Box door and replace as necessary.

  IMPORTANT: The appliance will not function unless the seal around the control box door is sound and the door secured with the M4 screws and rubber washers.
- **Flue Pipes:** For flued appliances it is important that periodic sweeping of the flue is carried out according to the National or Local regulations in force.
- **Auxiliary Controls:** Room thermostats, time switches, frost thermostats etc should be checked to ensure correct functioning, and are set to the user requirements.
- **Re-assemble and Commission:** Re-assemble the appliance in reverse order and commission in accordance with the instructions contained in Section 18.0).

20.0) TROUBLESHOOTING GUIDE


Turn on power and thermostat. Does the red neon indicator come on in the control box?
No
Yes
Is there 230V between L and N on Power In section of the terminal block in the control box?
No
Check power voltage at thermostat and repair fault.
Yes
Is there any loose or wrong connection at the terminal block in the control box?
No
Repair connection.
Yes
Are the brown lead wire and blue lead wire terminals securely on the red neon indicator?
No
Repair connection.
Yes
Is there 230V across terminals on the red neon indicator?
No
Restart troubleshooting.
Yes
Replace the red neon indicator.
Is the fan on?
No
Are there any loose or wrong wire connections at the fan?
Yes
Repair connection.
No
Is there 230V between L and N on Fan section of the terminal block in the control box?
No
Is there terminal block properly connected to the ignition module?
No
Repair connection.
Yes
Is there 230V between terminal 5 of the terminal block of the ignition module and earth?
No
Replace ignition module.
Yes
Check the continuity between terminal 5 and terminal L to fan. Repair connection if necessary.
Yes
Disconnect the power and check motor lead wires. Any wire broken?
Yes
Repair broken wires.
No
Replace motor
Does the amber neon indicator come on in the control box?
No
Are the violet lead wire and blue lead wire terminals securely on the amber neon indicator?
No
Repair connection.
Yes
Check the violet wire connection between amber neon indicator and air switch. Is there any loose connection?
Yes
Repair connection.
No
Check the blue wire connection between amber neon indicator and terminal block. Is there any loose connection?
Yes
Repair connection.
No
Is the air hose properly installed between air switch and test nipple on air plate?
No
Repair connection.
Yes
Is their any blockage in the fresh air duct or in the exhaust venting duct?
Yes
Remove blockage.
No
Jumper the NO and COM at air switch. Does the amber neon indicator come on?
Yes
Replace air switch.
No
Replace amber neon indicator.
Yes
Troubleshooting continued on the next page.

Note: when troubleshooting inside the control box, shut off gas valve and restart the power to the control box. Othewise, the control box should be installed with its lid.


Troubleshooting continued from the previous page.
30 seconds after startup, does the amber neon indicator stay on in the control box?
No
Yes
Troubleshooting ends.
Check the gas supply to the control box. Is gas pressure greater than the minimum for the gas type?
No
Turn on all gas shut off valves upstream the control box.
Yes
Is the step opening setting correct?
No
Correct the setting.
Yes
Is the orifice blocked?
Yes
Clear the blockage at the orifice.
No
Is the ignition module properly connected to the gas valve inside the control box?
Yes
No
Repair connection.
Is the grey wire securely connected to the ignition module and the electrode?
Yes
No
Repair connection.
Is the green/yellow wire securely connected to the electrode and earth?
Yes
No
Repair connection.
Shut off gas supply, jumper air switch COM and NO, and call for heat. After 20 seconds, is there continuous sparking?
No
Yes
Is the ceramic insulator OK on the spark electrode?
No
Replace the spark electrode.
Yes
Is the spark gap 3.5mm?
No
Adjust the spark gap to 3.5mm.
Yes
Replace the ignition module & ignition cable.
Check the spark gap. Is it 3.5mm?
Yes
No
Adjust the spark gap to 3.5mm.
Has all the air been purged from the gas supply lines?
Yes
No
Purge the gas supply line.
Check the inlet pressure to the gas valve. Is it between minimum and maximum for the gas type?
Yes
No
Adjust supply gas pressure. Restart troubleshooting.
Check the manifold gas pressure during startup. Is it zero inches?
No
Yes
Replace gas valve.
Check orifice and holder for blockage (i.e. spider web). Is there any blockage?
No
Yes
Clear blockage.
After an initial step opening, is the manifold gas pressure correct?
Yes
No
Adjust manifold gas pressure. Restart troubleshooting.
Call factory for assistance.

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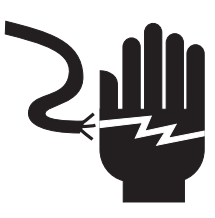
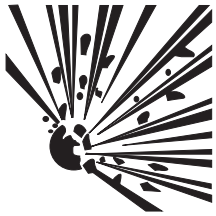
July 2012

21.0) REPLACING PARTS

⚠ WARNING





ELECTRIC SHOCK & EXPLOSION HAZARD

Disconnect electrical power and gas supply before servicing.

Failure to do so may result in death or serious injury.

Only use genuine Space-Ray replacement parts. Parts are available from the factory for replacement by a licensed person. Refer to the Replacement Parts Guide in Section 24.0) for all replacement parts.

IMPORTANT: Disconnect gas and electricity supplies to the appliance before carrying out any repair work. This work can be carried out at high level using a purposes designed access tower, but it is preferable that this work should be carried out at ground level.

21.1) REMOVAL OF ELECTRODES

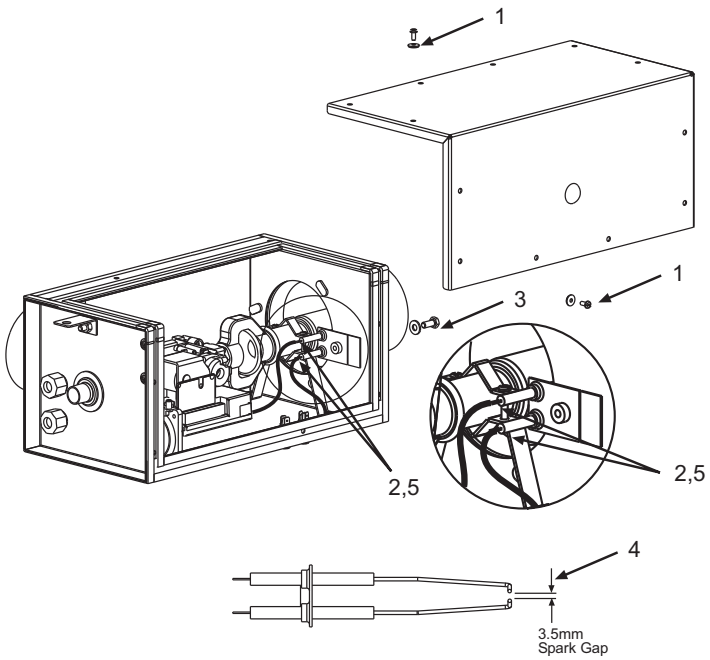


Fig. 31

This range of radiant tube heaters employs a single probe electrode system whereby both the spark generation and flame supervision operations are carried out via a common electrode. The second electrode provides the earth path for the ignition spark. The two electrodes are identical, therefore either lead (grey HT or green/yellow - earth) may be connected to either electrode.

1. Open the Control Box door by removing the screws, care must be taken not to lose the rubber sealing washers.
2. Disconnect the grey HT ignition/flame sensor lead and the green/yellow earth lead from the electrodes by gently pulling the connectors, using pliers.
3. Unscrew the M6 x 16 set-screw securing the electrode carrier to the Control Box and remove the Electrode Assembly.
4. Remove any foreign matter from the Electrode tips and check that the spark gap is 3.5mm. If the Electrode rods are badly oxidized, replace the electrodes.
5. Upon re-assembly, ensure that the HT lead and earth lead connectors are securely attached to the Electrodes.

21.2) REMOVING MAIN BURNER

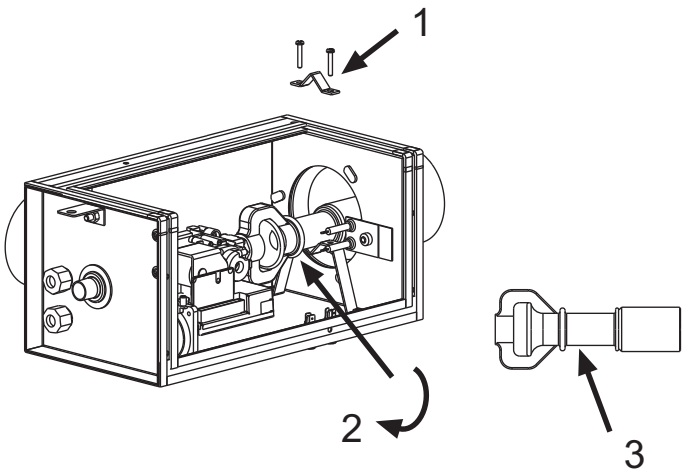


Fig. 32

1. Open the control box door; unscrew the two M4 x 25 setscrews from the Burner Bracket and remove the Burner Clamp.
2. Unscrew the Burner from the Injector Fitting
3. Lift the burner out of the Control Box.

21.3) REMOVING INJECTOR

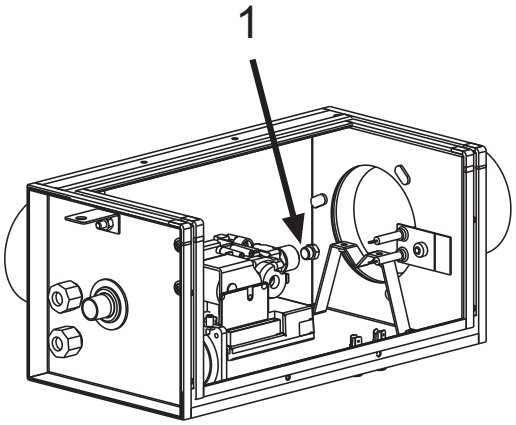


Fig. 33

1. Remove the Burner as described at above. Unscrew the Injector from the Injector Fitting, using a spanner, whilst retaining the Injector Fitting with a second spanner.
2. Inspect the Injector and clean as necessary with a soft bristle brush.

   DO NOT DAMAGE THE INJECTOR ORIFICE BY USE OF SOLID OBJECTS.

21.4) REMOVING IGNITION CONTROL

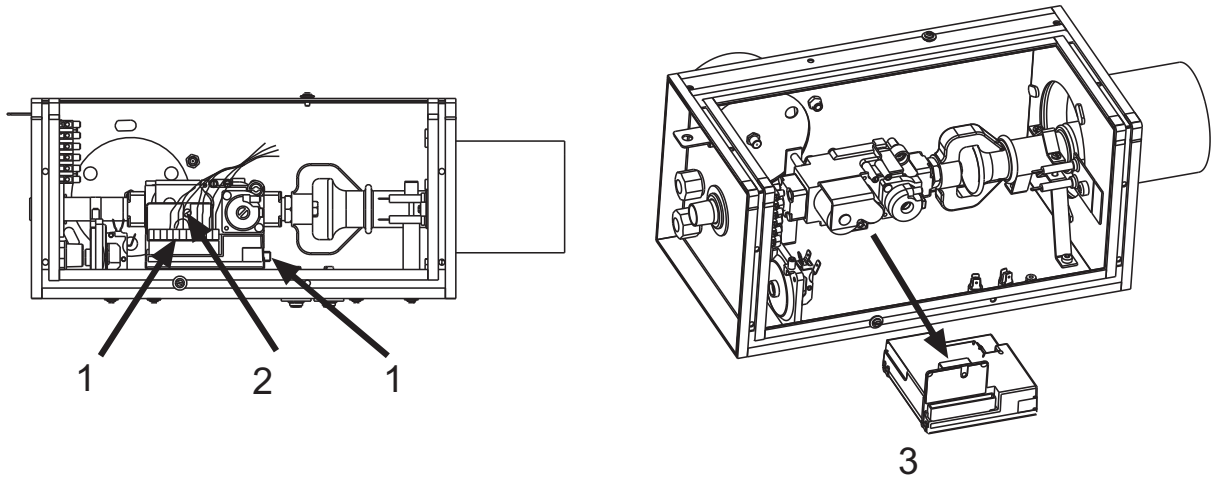


Fig. 34

1. Disconnect the 12 way Molex electrical connector and the grey HT ignition spark/flame sensor lead from the Ignition Control.
2. Unscrew the M3 screw securing the Ignition Control to the Control Valve.
3. Slide out the Ignition Control.

21.5) REMOVING AIR SWITCH

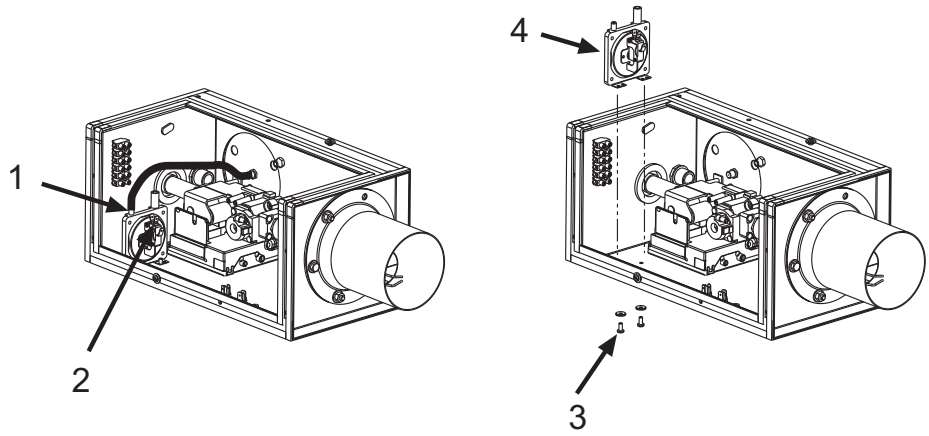


Fig. 35

1. After opening the control box door, remove the Air Tube Assembly from the Air Switch pressure connection marked 'H'.
2. Disconnect the three electrical leads from the Air Switch by gently pulling the connectors, using pliers.
3. Unscrew the two No. 8 x 12 self-tapping screws securing the Air Proving Switch to the floor of the Control box and lift out with the electrical leads attached.
4. Remove the Air Switch, and remove the restrictor from the Air Switch connection marked 'L'.

When installing a replacement Air Switch, take care to connect the electrical leads in accordance with the wiring diagram shown in Section 15.0) – Fig. 35 and replace the restrictor on the pressure connection marked L. The appliance will not function unless this restrictor is in place.

21.6) REMOVING GAS VALVE AND MANIFOLD ASSEMBLY

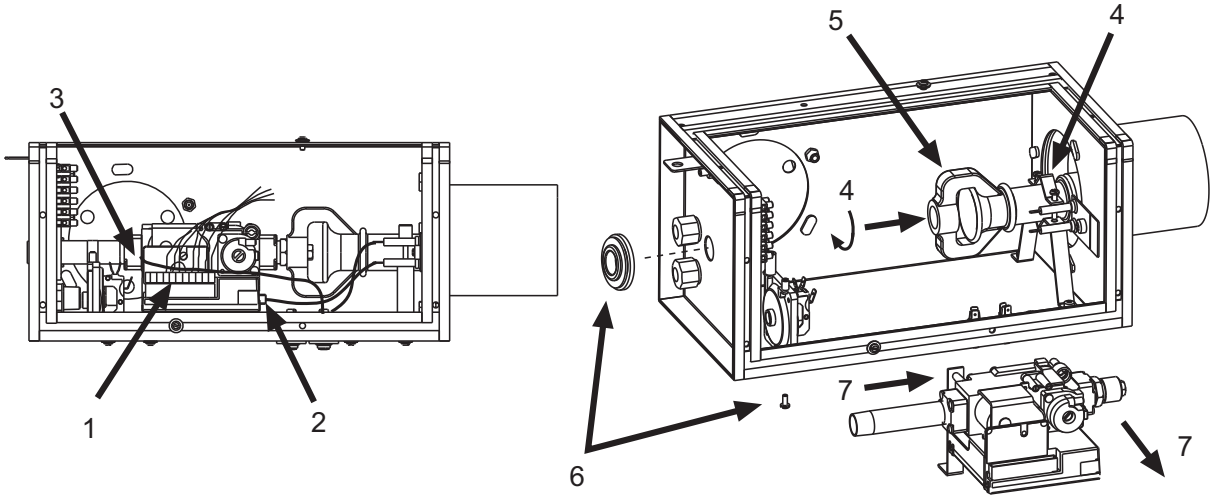


Fig. 36

1. After opening the control box door, disconnect the 12 way Molex electrical connector.
2. Disconnect the grey HT ignition spark/flame sensor lead from the ignition module.
3. Disconnect the green/yellow wire from the grounding tab of gas valve.
4. Unscrew the two M4x25 setscrews from the burner bracket and remove the burner clamp.
5. Unscrew the burner and slide it away from the valve.
6. Unscrew the M4 screw securing the valve bracket to the control valve and remove the grommet.
7. Slide out the complete assembly of gas valve, ignition module and manifold.

After replacing the Control Valve, check the gas pressures in accordance with Section 14.0) of this manual.

IMPORTANT: TEST FOR GAS SOUNDNESS USING A SUITABLE LEAK DETECTION FLUID.

21.7) REMOVING NEON INDICATOR

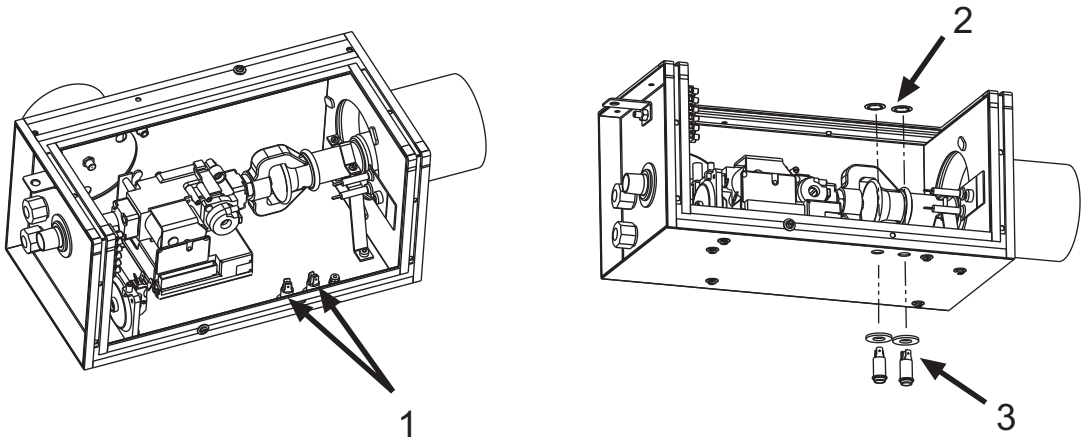


Fig. 37

1. Disconnect the electrical leads from the Neon Indicators by gently pulling the connectors, using pliers.
2. Remove the star washers.
3. Press the neon indicator out through the mounting hole in the floor of the control box.

When replacing a Neon Indicator, connect the electrical leads in accordance with the wiring diagram shown in Section 15.0) – Fig. 27.

21.8) REMOVING AIR INLET PLATE

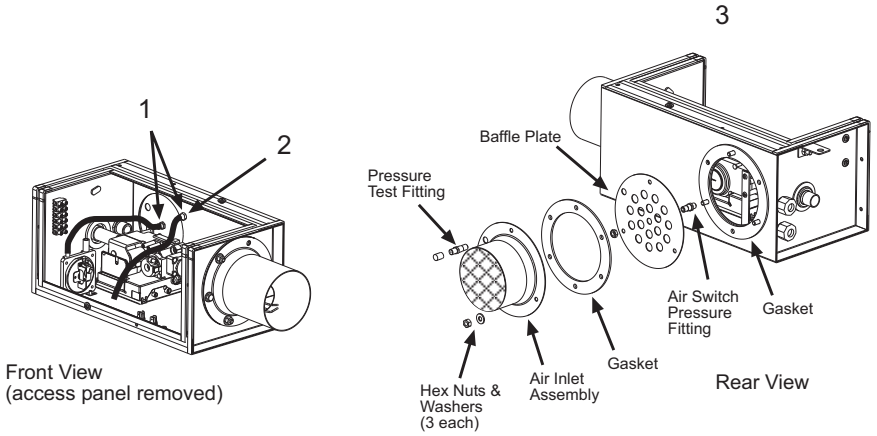


Fig. 38

1. After opening the control box door, disconnect tubing from both brass pressure test fittings.
2. Remove brass nut from pressure test fitting.
3. Disassemble components from the control box.

21.9) REMOVING THE FAN

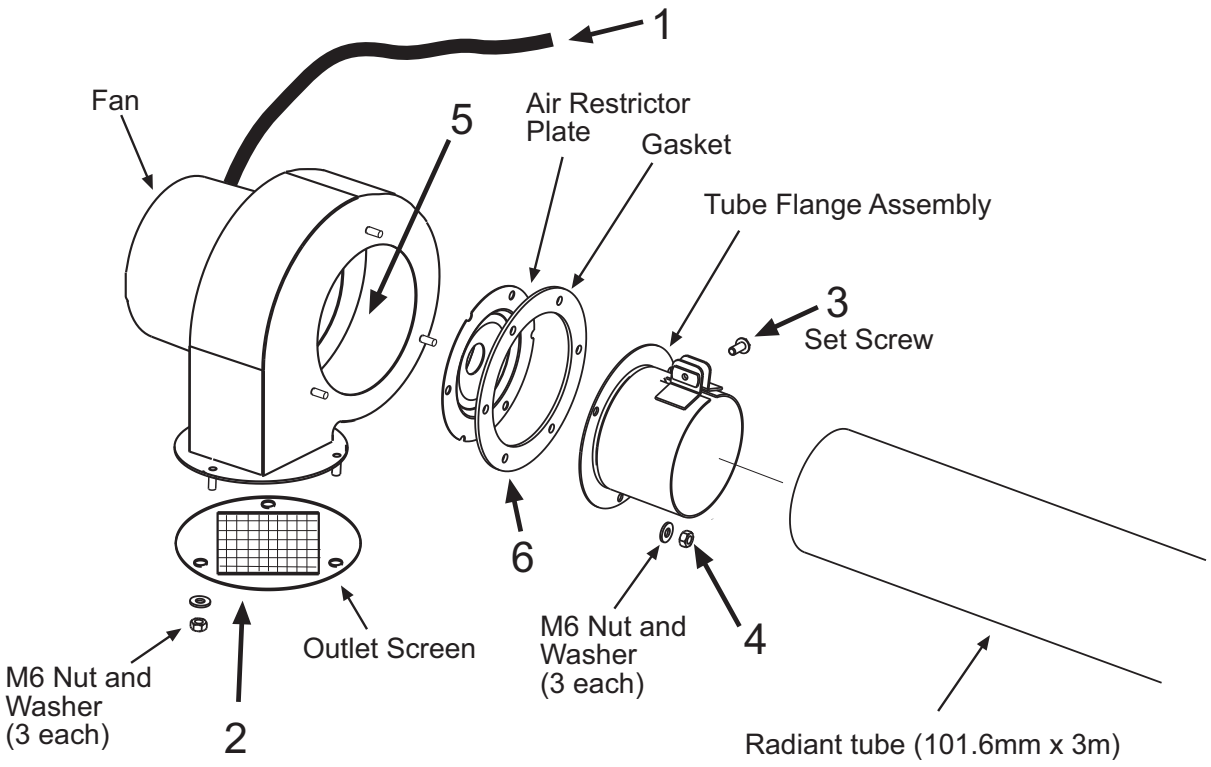


Fig. 39

1. Disconnect the electrical wires from the fan (see Section 15.0) for connection details.
2. If a flued installation, disconnect the flue from the Fan.
3. Loosen set screw from Tube Flange Assembly. Draw the Fan Assembly off the Radiant Tube.
4. Unscrew the three M6 nuts and washers securing the Connector and Air Restrictor Plate to the fan.
5. Inspect the main impeller and secondary cooling impeller and remove any dust by brushing with a soft brush. Check that the impeller rotates freely and that there is no excessive play in the bearings. The bearings are pre-lubricated and require no attention.
6. When re-assembling the Air Restrictor Plate and Connector a new Gasket must be fitted between the Tube Flange Assembly and Air Restrictor (orifice) Plate (see Fig. 39).

22.0) CONVERSION INSTRUCTIONS

CONVERSION FROM CAT. 2H (G20) TO CAT. 3P (G31)

1. Remove the Injector from the Injector Fitting (see Section 21.3) and replace it with the alternative Injector supplied (fastenings pack). Check that the size reference marked on the Injector agrees with that listed in the Specifications table (Section 5.0) for the appliance model in question.
2. Remove the pressure governor cap from the integral pressure governor of the Control Valve and screw the adjuster clockwise to increase the gas pressure, check supply and manifold pressure in accordance with Section 14.0). Replace the pressure governor cap.
3. Affix the gas adjustment label (3P G31, 37mbar) supplied (fastenings pack) onto the Data Label, adjacent to the headings "Adjusted For" and "Setting Pressure", to cover the original gas adjustment label (2H, G20, 20mbar).
4. Carry out checks in accordance with Section 14.0) of this manual to ensure correct supply pressure relative to the gas type being used (G31 - Propane).
5. Remove the step-opening adjustment cap on the valve; turn clockwise the arrow to dot 4; recap the step-opening adjustment cap. (see Fig. 40)

CONVERSION FROM CAT. 3P (G31) TO CAT. 2H (G20)

1. Remove the Injector from the Injector Fitting (see Section 21.3) and replace it with the alternative Injector supplied (fastenings pack). Check that the size reference marked on the Injector agrees with that listed in the Technical Data table (Section 5.0) for the appliance model in question.
2. Remove the pressure governor cap from the integral pressure governor of the Control Valve and unscrew the adjuster counter clockwise to increase the gas pressure, check supply and manifold pressure in accordance with Section 14.0). Replace the pressure governor cap.
3. Affix the gas adjustment label (2H, G20, 20mbar) supplied (fastenings pack) onto the Data Label adjacent to the headings, "Adjusted For" and "Setting Pressure" to cover the original gas adjustment label (3P G31, 37mbar).
4. Carry out checks in accordance with Section 14.0) of this manual to ensure correct supply pressure and setting pressure, relative to the gas type being used (G20 - Natural Gas).
5. Remove the step-opening adjustment cap on the valve; turn counterclockwise the arrow to min; recap the step-opening adjustment cap. (see Fig. 40)

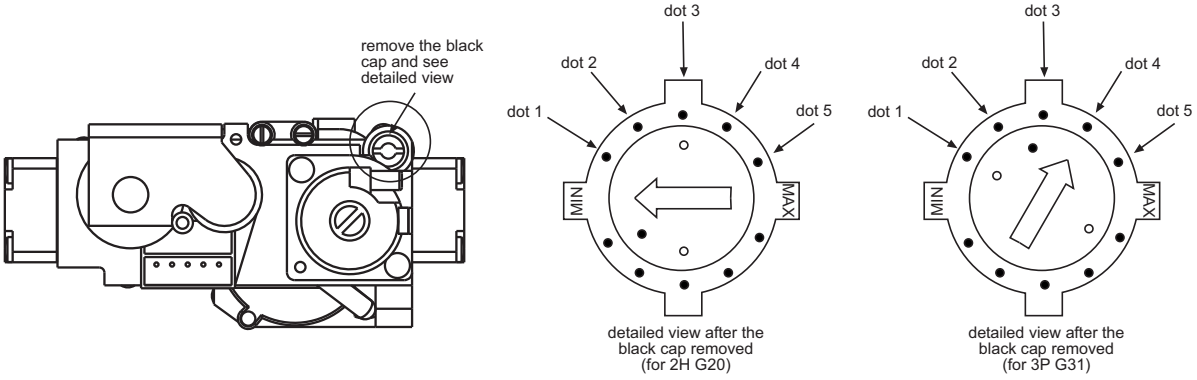

remove the black cap and see detailed view
dot 1
dot 2
dot 3
dot 4
dot 5
MIN
MAX
detailed view after the black cap removed (for 2H G20)
detailed view after the black cap removed (for 3P G31)

Fig. 40

23.0) INSTALLATION DATA

Date of Installation: _____ # of Heaters in System: _____

Serial No. _____

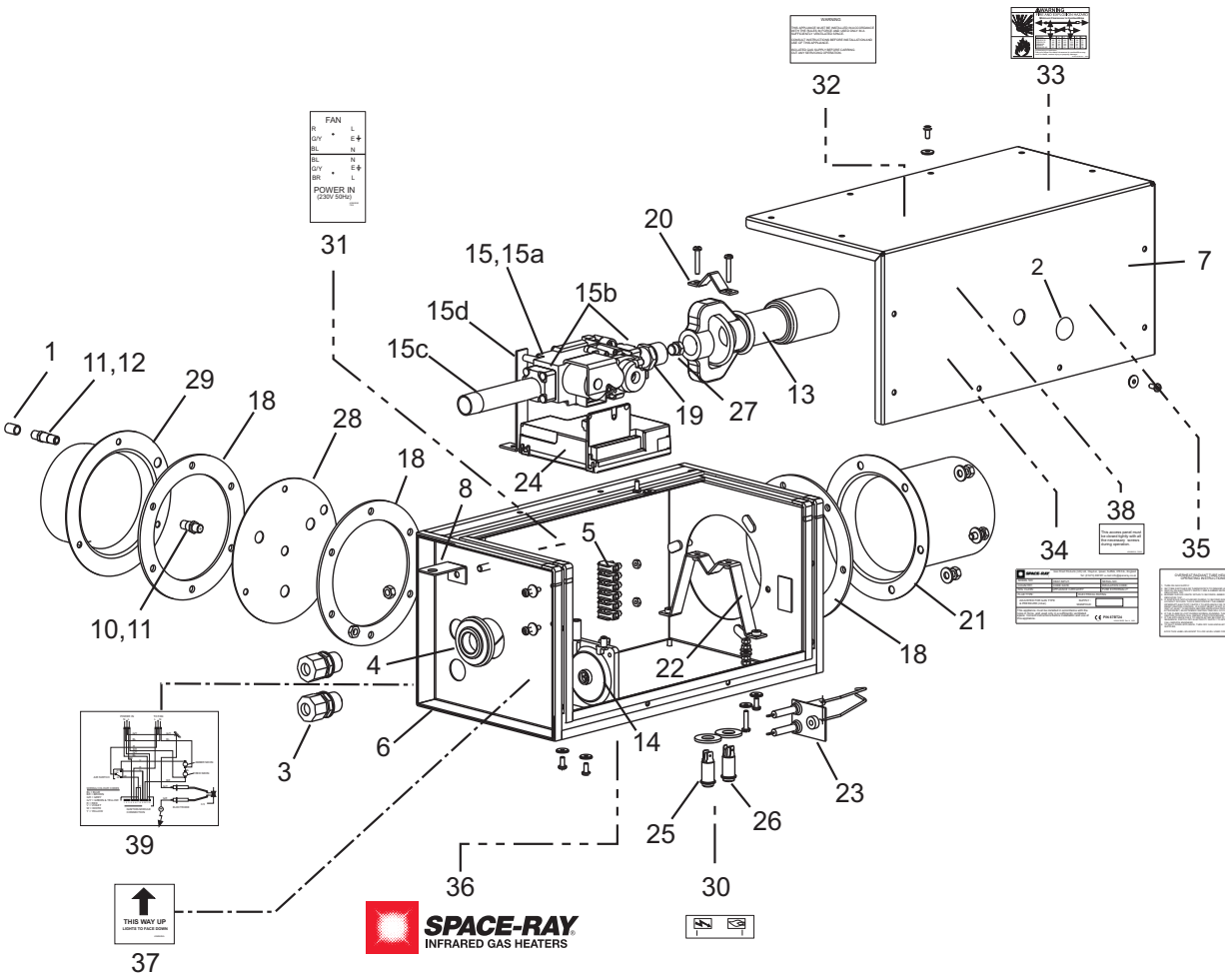
Model: **SBF** _____ N = Natural Gas L = Propane Gas

24.0) REPLACEMENT PARTS GUIDE

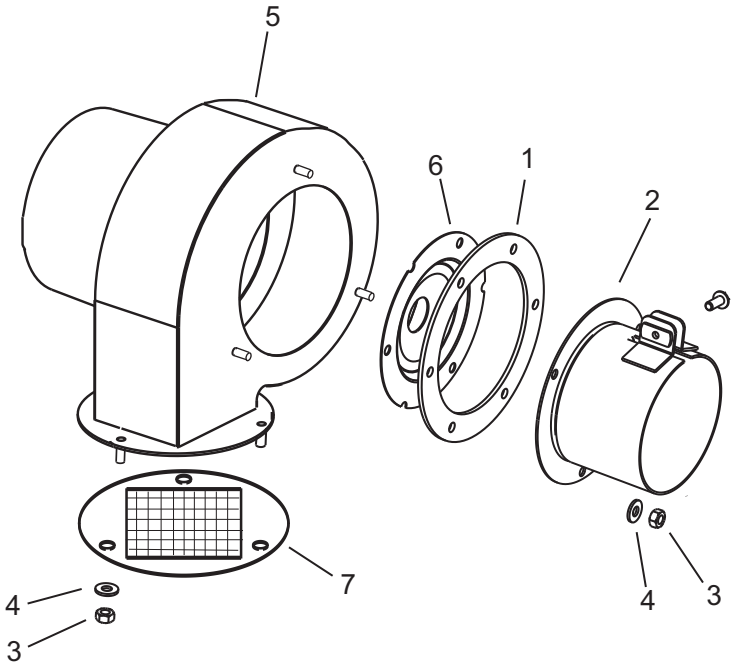
The following is a list of replacement parts which may be required during the life of the appliance.

CONTROL COMPONENTS			
Item No.	**Part No.**	**Description**	**Qty.**
1	02330010	Vinyl Cap	1
2	02331010	Plug, Liquid Tight Hole	1
3	30635020	Cord Connector - Liquid Tight	2
4	30700040	Grommet, Pipe Sealing	1
5	30739010	Terminal Block - 6 Pole	1
6	44190110	Housing (complete with gaskets)	1
7	44193150	Access Panel	1
8	44202010	Turnbuckle Holder Bracket	1
8a	30545040	Turnbuckle (Not shown)	1
9	03988070	Tubing, Silicone – 178mm Lg. (Not shown)	2
10	2113	Pressure Test Point	1
11	4260363	Test Nipple	1
12	4262322	Brass Locknut	2
13	4250600	Burner Fabrication	1
14	4250625	Air Switch Assembly	1
15	44427000	Gas Valve Assembly (complete)	1
15a	4262586	Gas Valve #VK4105C	1
15b	4262552	Flange, 1/2 BSPT - Straight	2
15c	4260502	Pipe Nipple, 1/2 BSPT x 110mm	1
15d	44428000	Gas Valve Bracket	1
16	42506950	Wiring Harness (less H/T cable) (Not shown)	1
17	42510929	H/T Cable – 178mm Lg. (Not shown)	1
17a	43447070	Gas Valve Ground Wire - Green/Yellow (not shown)	1
18	4260132	Gasket	3
19	4260364	Injector Fitting	1
20	4260367	Burner Clamp	1
21	4260371	101.6mm Connector	1
22	4260380	Burner Bracket	1
23	4260541	Electrode	1
24	4262197	Ignition Control	1
25	4262280	Neon Light - Red (round)	1
26	4262281	Neon Light - Amber (round)	1
27	03259xxx	Gas Injector (State Model & Gas Type for Size)	1
28	4260360x	Baffle Plate (State Model & Gas Type for Size)	1
29	4260362	Air Inlet Fabrication	1

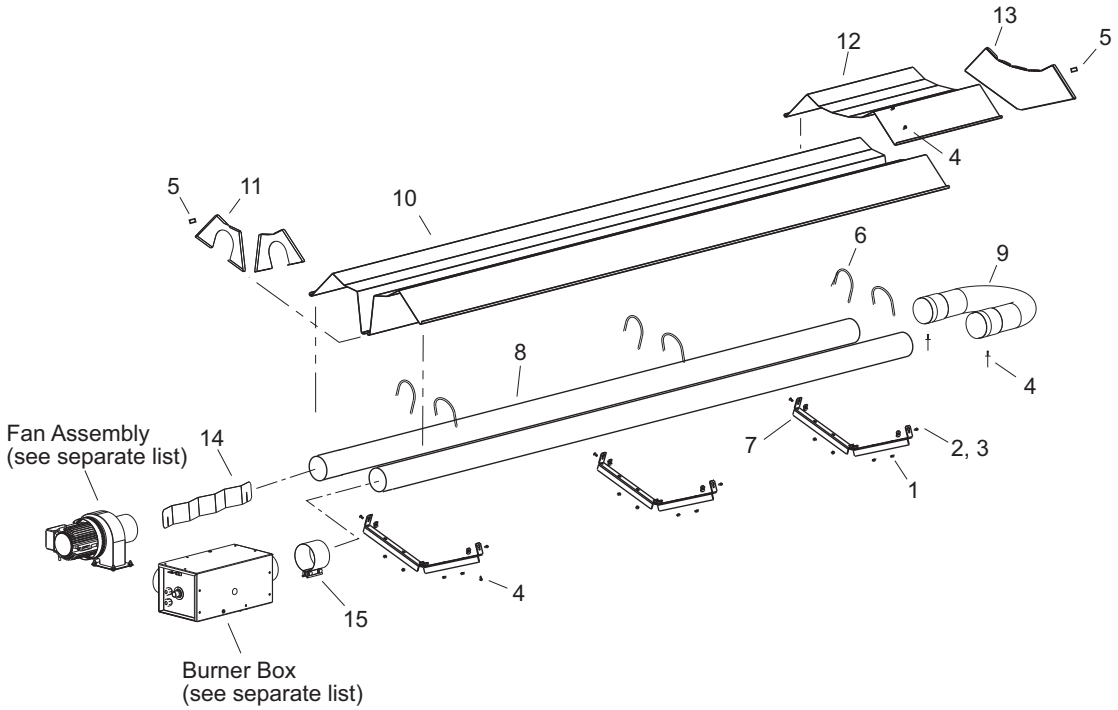
LABELS/MANUAL			
Item No.	**Part No.**	**Description**	**Qty.**
30	4262036	Label Neon	1
31	43269080	Label, Fan/Power Supply	1
32	4260420	Label, Warning - GB/IE	1
33	43344160GB	Label, Clearances to Combustibles	1
34	42848130GB	Label, Nameplate	1
35	4260440	Label, Operating Instructions - GB	1
36	4262000	Label, Space-Ray Logo	1
37	4260625A	Label, “This Way Up”	1
38	43269050	Label, Door Remains Closed	1
39	42874070	Label, Wire Connections	1
40	44201200	Installation/Operation Manual	1


FAN
POWER IN
(230V 50Hz)
31
32
33
20
15,15a
15b
15d
15c
2
7
1
11,12
29
18
28
18
8
24
5
19
27
13
38
34
35
10,11
4
22
18
21
3
6
14
23
25
26
39
36
30
37
THIS WAY UP
SPACE-RAY
INFRARED GAS HEATERS

42509378 Fan Assembly			
Item No.	**Part No.**	**Description**	**Qty.**
1	4260132	Gasket	1
2	44015251	101.6mm Connector (tube flange assembly with set screw)	1
3	4267216	M6 Hex Nut	6
4	4267266	M6 Spring Lockwasher	6
5	30742050	IP55 Fan Unit - McMillan	1
6	42741080	Air Restrictor Plate – 47.6mm ID	1
7	44200060	Flue Plate Outlet - 116mm Dia. (with screen)	1



BODY COMPONENTS			
Item No.	Part No.	Description	Qty.
1	02127110	Hex Nut 5/16-18	12
2	02125130	Screw #10-24 x ½" Round Head Machine	6
3	42769010	Sliding Clamp (reflector)	6
4	02189020	Screw #10 x ½" Self-Drilling (TEKS)	12
5	02266010	Reflector Speed Clip	15
6	42873000	U-Bolt Clamp	6
7	43318050	Tube Support/Hanger Bracket - 19deg	3
8	41932100	Radiant Tube (101.6mm dia. x 3m long)	2
9	42913000	U-Bend (305mm centers)	1
10	43319100	Reflector, Main (3035mm long)	2
11	43320000	Reflector, Head End	2
12	43490010	Reflector, U-Bend Overlap	1
13	43490020	Reflector, Foot End	1
14	44152240	Turbulator	2
15	30462980	Torctite Coupling	1
16	30303010	"S" Hook – Burner/Heater Suspension (not shown)	6
17	30545040	Turnbuckle – Burner Suspension (not shown)	1



Note:
1) Screws, Nuts and Washers are standard hardware items and can be purchased at any local hardware store.
2) Please order by PART NUMBER – not by Item Number.
3) Replacement Part Prices are available when ordering.
4) Please refer to complete Model Number when ordering.
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